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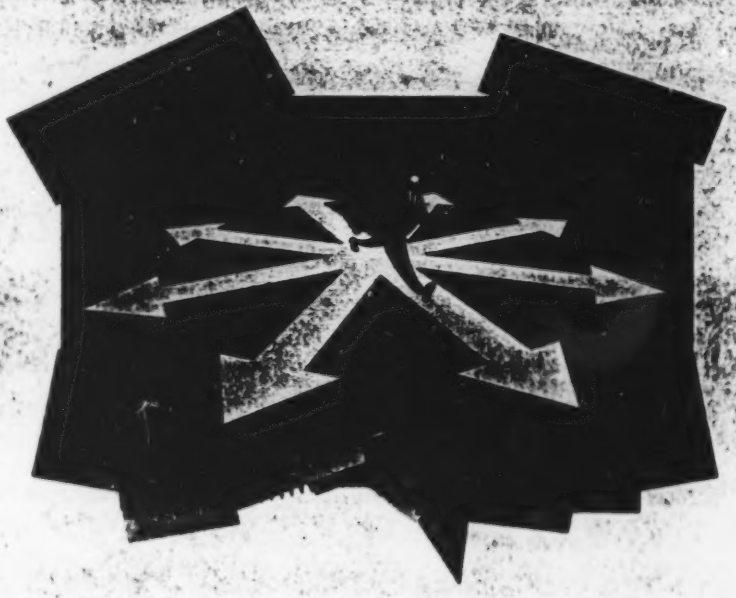
ABSTRACT

These proceedings present 10 papers, each of which is followed by written comments/critiques. Following the conference program the papers are as follows: "Priority Topics for Faculty Development in Agricultural Distance Education" (Greg Miller, Ana Carr) reports faculty placed greater emphasis on planning and teaching behavior. "Interaction Needs of Distance Learners: Synchronous versus Asynchronous" (W. Wade Miller et al.) finds learners were satisfied and suggested instructors needed personal contact with all learners. "Michigan Citizens' Knowledge and Attitudes of Groundwater Stewardship" (Dave Krueger et al.) proposes that strategies that effectively use the Michigan Groundwater Stewardship Program's limited resources be developed. "Motivating and Recognizing Adult Volunteer 4-H Leaders" (Ken Culp, III) reports motives included their own children's involvement and their own positive experiences and 4-H member-originated recognition as the most desirable. "Appropriateness of Agriculture Education Goals and Curriculum Content Topics in Rural Zimbabwe High Schools" (Tabitha Madzura, Robert J. Birkenholz) cites positive responses from teachers and school headmasters and provides program and curriculum models. "Influences of an Elementary Agri-Science Program on Student Perceptions of and Performance in Science and Agriculture" (Cary Trexler, Murari Suvedi) reports grade 5 students' positive perceptions about science. "Reasons Preservice Teacher Education Students Major in Agricultural Education" (Kirk A. Swortzel) reports these reasons in rank order: mission of agricultural education, personal satisfaction, and goal satisfaction. "Demographic Profile of Agriculture Teacher Education Graduates and the Relationship of Their Current Occupational Status" (Kirk A. Swortzel, R. Kirby Barrick) finds teachers of agriculture enter and remain in the teaching profession for reasons associated with the mission of agricultural education. "Using Experiential Learning to Teach Evaluation Skills" (Linda Wulff-Risner, Bob R. Stewart) supports the efficacy of audiovisual techniques in teaching horse judging skills. "The Interaction Effect of Teaching Approach and Learning Style on Student Achievement and Satisfaction in a Senior Level Animal Science Course" (Greg Miller, Mark Honeyman) reports a significant interaction between laboratory section and teaching approach for achievement. Two poster sessions are included: "Enhancing Professional Development for Agricultural Education Students" (Jason D. Haak et al.) and "Rural Citizen Perspectives on Michigan Groundwater: Findings from Focus Group Interviews" (David Krueger et al.). (YLB)

ED 405 500

Planning for The Future: Research in Agricultural Education



Proceedings of the 51st AAAE Central Region Research Conference in Agricultural Education

February 27-March 1, 1997

St. Louis, Missouri

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Planning for the Future: Research in Agricultural Education

Proceedings of the 51st Annual AAAE Central Region Research Conference and Seminar in Agricultural Education

Compiled and Edited by:
Kirk A. Swortzel
B. Allen Talbert
Purdue University

February 27 - March 1, 1997
Adam's Mark Hotel
St. Louis, Missouri

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Preface

The AAAE Central Region Research Conference in Agricultural Education is a major forum for disseminating results of research and scholarly efforts within the Central Region of the American Association for Agricultural Education (AAAE). This fifty-first research conference was an annual activity which involves the presentation of papers selected through a blind review process. Reviewers from within the profession, but from states outside the region were asked to review each paper proposal received for consideration.

Ten proposals were accepted after receiving recommendations from members of the external review panel. The acceptance rate for papers presented at the 1997 AAAE Central Region Research Conference was 43 percent.

Seven criteria were established a priori for use in making decisions regarding acceptance of papers for the 1997 AAAE Central Region Research Conference. These criterion included:

1. Had to follow paper specifications
2. Had to be among the highest rated papers as ranked by evaluators
3. Had to have at least 139 points out of a possible score of 231 points
4. Had to have two ratings of either a 4 or 5 or combination of 4 and 5
5. Had to have 3.00 or higher average rating
6. Could not have two rejection ratings of 1 or 2
7. Comments given should support paper's presentation.

Papers submitted for presentation at the AAAE Central Region Research Conference were forwarded to one of five discussants selected from within the region who were asked to review two papers and then submit written comments which were also printed in the conference proceedings.

Papers presented at the 1997 AAAE Central Region Research Conference are listed in the table of contents in the order they were presented. Written comments provided by discussants are printed immediately after each respective paper.

Authors of papers delivered at the 1997 AAAE Central Region Research Conference were allowed 20 minutes for their presentation. Two papers were presented in five sessions. Discussant comments were presented orally following the conclusion of paper presentations in each session. Following the discussant comments, paper presenters were provided with the opportunity to respond to questions or concerns raised by the discussant. The session chairperson was then asked to serve as a moderator to lead a group discussion involving members of the audience, the paper presenters, and the discussants for the remainder of the one hour and fifteen minute session.

Reviewer Acknowledgments

Reviewers from the AAAE regions outside the Central Region read each paper proposal as part of the blind review process. Independent recommendations and numerical ratings were examined to select papers to be presented. Sincere gratitude is extended to the following individuals who served as external reviewers for the 1997 AAAE Central Region Research Conference in Agricultural Education.

Dr. Matt Baker	University of Florida
Dr. Gary Briers	Texas A&M University
Dr. Bill Camp	Virginia Tech
Dr. Joe Harper	Clemson University
Dr. Ray Herren	University of Georgia
Dr. John Hillison	Virginia Tech
Dr. Joe Kotrlik	Louisiana State University
Dr. David Lawver	Texas Tech University
Dr. John Mundt	University of Idaho
Dr. Michael Newman	Mississippi State University
Dr. Matt Raven	Mississippi State University
Dr. Brenda Seevers	New Mexico State University
Dr. Glen Shinn	Texas A&M University
Dr. Robert Torres	New Mexico State University
Dr. Randol Waters	University of Tennessee
Dr. Susie Whittington	Penn State University

Program

American Association for Agricultural Education
Central Region Research Conference and Seminar
February 27-March 1, 1997
Adams Mark, St. Louis, MO

Thursday, February 27

7:00 p.m. - 9:00 p.m.	Conference Registration - Outside St. Louis C
9:00 p.m. - 11:00 p.m.	Poster Session Set-Up - Rose Garden Room

Friday, February 28

8:00 a.m. - 8:30 a.m.	Conference Registration - Outside Director's Row 29
8:30 a.m. - 8:45 a.m.	Welcome and Orientation - Directors Row 29 *Drs. Kirk A. Swortzel and B. Allen Talbert* *1997 CRRC Co-Chairs* *Purdue University*
8:45 a.m. - 10:00 a.m.	Concurrent Research Sessions
	Concurrent Session A - Directors Row 29 Theme: Distance Education
	Concurrent Session B - Directors Row 26 Theme: Extension Education
10:00 a.m. - 10:30 a.m.	Refreshments and Break - Outside Directors Row 29
10:30 a.m. - 11:45 a.m.	Concurrent Research Sessions
	Concurrent Session C - Directors Row 29 Theme : Curriculum Development
	Concurrent Session D - Directors Row 26 Theme: Teacher Education

12 noon - 1:15 p.m.	Lunch (provided with registration) - AJ's Nightclub *Chairpersons: Drs. Kirk A. Swortzel and B. Allen Talber, Purdue Universityt* *Luncheon Speaker: Dr. Gary Moore, North Carolina State University*
1:30 p.m. - 2:45 p.m.	**Concurrent Session E - Directors Row 29** Theme: Teaching and Learning
2:45 p.m. - 3:30 p.m.	Refreshments and Break - Outside Rose Garden Room
2:45 p.m. - 3:30 p.m.	View Posters - Rose Garden Room
3:30 p.m. - 5:00 p.m.	"Issues Facing the AAAE Central Region" - Directors Row 29 *Chairperson: B. Allen Talbert, Purdue University* Breakout Sessions: Everyone will attend a session for 15 minutes and rotate to the next session Session 1: Director's Row 29 •Future of AAAE Central Region Ag Ed Conference *Chairperson: Clark Hanson, South Dakota State University* *Facilitator: Dan Husmann, South Dakota State University* Session 2: Directors Row 27 •Future of AAAE Central Region Ag Ed Departments *Chairperson: Bryan Garton, University of Missouri* *Facilitator: Robert Birkenholz, University of Missouri* Session 3: Directors Row 26 •The Mission and Vision of Agricultural Education *Chairperson: Kirby Barrick, University of Illinois* *Facilitator: Kirk Swortzel, Purdue University*
5:00 p.m. - 5:15 p.m.	Summary and Wrap-Up of Sessions - Directors Row 29

Saturday, March 1

7:00 a.m. - 7:45 a.m.	Breakfast - Rose Garden Room
	Posters must be taken down no later than 7:45 a.m.
8:00 a.m. - 9:30 a.m.	"Defining Our Vision, Mission, and Goals for the AAAE Central Region" - Directors Row 26 *Chairperson: Kirk Swortzel, Purdue University* *Facilitators: Allen Talbert, Purdue University* *Roland Peterson, University of Minnesota*
9:30 a.m. - 10:00 a.m.	Refreshments and Break - Outside Directors Row 26
10:00 a.m. - 12 noon	Central Region AAAE Business Meeting - Directors Row 26 *Chairperson: Roland Peterson, University of Minnesota* *Facilitator: Jamie Cano, The Ohio State University*
12 noon	Conference Evaluation and Depart for Home

Concurrent Session A
Distance Education

Paper #A1: Priority Topics for Faculty Development in Agricultural Distance Education

Presenters: Greg Miller and Ana Carr, Iowa State University

Paper #A2: Interaction Needs of Distance Learners: Synchronous versus Asynchronous

Presenters: Wade Miller, Jill Webster and Timika Gray, Iowa State University

Chairperson: Jeff Wood, Illinois State University

Discussant: Dann Husmann, South Dakota State University

Facilitator: Linda Moody, University of Nebraska

Concurrent Session B
Extension Education

Paper #B1: Michigan Citizens' Knowledge and Attitudes of Groundwater Stewardship

Presenters: David Krueger, Murari Suvedi, and Dixie Bettinghouse, Michigan State University

Paper #B2: Motivating and Recognizing Adult Volunteer 4-H Leaders

Presenter: Ken Culp, The Ohio State University

Chairperson: Mark Zidon, University of Wisconsin - Platteville

Discussant: Steve Harbstreit, Kansas State University

Facilitator: Jim Riley, University of Missouri

Concurrent Session C
Curriculum Development

Paper #C1: Appropriateness of Agriculture Education Goals and Curriculum Content Topics in Rural Zimbabwe High Schools

Presenters: Tabitha Madzura and Robert Birkenholz, University of Missouri

Paper #C2: Affects of an Elementary Agri-Science Program on Student Perceptions and Performance in Agriculture and Science

Presenters: Cary Trexler and Murari Suvedi, Michigan State University

Chairperson: Ozzie Gilbertson, University of Nebraska

Discussant: Robert Martin, Iowa State University

Facilitator: Terri Porter, The Ohio State University

Concurrent Session D
Teacher Education

Paper #D1: Reasons Why Preservice Teacher Education Students Major in Agricultural Education

Presenter: Kirk A. Swortzel, Purdue University

Paper #D2: Demographic Profile of Agricultural Education Graduates and the Relationship of Their Current Occupational Status

Presenters: Kirk A. Swortzel, Purdue University and R. Kirby Barrick, University of Illinois

Chairperson: Jim Dyer, Iowa State University

Discussant: Lloyd C. Bell, University of Nebraska

Facilitator: Julie Tritz, Iowa State University

Concurrent Session E
Teaching and Learning

Paper #E1: Using Experiential Learning to Teach Evaluation Skills

Presenters: Linda Wulff-Risner and Bob Stewart, University of Missouri

Paper #E2: The Interaction Effect of Teaching Approach and Learning Style of Student Achievement and Satisfaction in a Senior Level Animal Science Course

Presenters: Greg Miller and Mark Honeyman, Iowa State University

Chairperson: Susan Fritz, University of Nebraska

Discussant: Larry Miller, The Ohio State University

Facilitator: Jason Haak, Purdue University

Schedule of Responsibility for Future AAAE Central Region Conferences in Agricultural Education

1998	South Dakota
1999	Michigan
2000	Illinois
2001	Ohio
2002	Kansas
2003	Wisconsin
2004	Iowa
2005	Missouri
2006	North Dakota
2007	Nebraska
2008	Minnesota
2009	Indiana

PRIORITY TOPICS FOR FACULTY DEVELOPMENT IN AGRICULTURAL DISTANCE EDUCATION

Greg Miller
Assistant Professor

Ana Carr
Graduate Assistant

Department of Agricultural Education and Studies
Iowa State University

Introduction /Theoretical Framework

Distance education offers an opportunity for meeting previously unmet educational needs in agriculture (Newcomb, 1993). However, this opportunity is fraught with challenges. Faculty who teach at a distance must

> ... develop an understanding of the characteristics and needs of distant students with little first-hand experience and limited, if any, face-to-face contact; adapt teaching styles taking into consideration the needs and expectations of multiple, often diverse audiences; develop a working understanding of delivery technology, while remaining focused on their teaching role; and function effectively as a skilled facilitator as well as a content provider (Willis, 1994).

Thus, an important challenge to higher education in agriculture concerns the professional development of faculty for the distance teaching experience. Willis and Touchstone (1996) noted that one key to successful distance education was faculty development and that faculty should receive training before their initial distance teaching experience.

Murphy and Terry (1995) characterized distance education as a communications process based on Gamble and Gamble's (1989) model. Murphy et al. focused on the obstacles and challenges faced by the sender of information (agricultural faculty) in distance education. They discovered that teaching faculty in agriculture lacked competence in the use of electronic technologies used in distance education and faculty perceived that training and assistance opportunities were limited. Murphy et al. recommended that programs be created to help teachers develop proficiency in teaching with electronic technologies.

To be successful, any education or training program must focus on needs of the learners. Newcomb, McCracken, and Warmbrod (1993, p. 30) wrote that "learning activities should be provided that take into account the wants, needs, interests, and aspirations of students." Faculty training is needed for distance education, but what are the perceived needs and interests of faculty? A determination of the information and training needs of agricultural educators related to distance education should be made. This information

will be useful in developing training programs to prepare agricultural faculty for successful distance teaching experiences.

Financial support for advancing a faculty development model in agricultural distance learning was provided by a USDA Higher Education Challenge Grant. To design a program that addressed important faculty development issues, a needs assessment was conducted. According to Caffarella (1982, p. 10) "identifying educational needs of potential participants is an important component in designing educational programs." A systematic needs analysis serves the important role of reducing uncertainty about educational programming (McKillip, 1987). The marketing needs assessment model described by McKillip was used to guide this study. The marketing model focuses on the needs and wants of a definable population. The ultimate goal of this model is to achieve a match between what the delivering institution is capable of providing and what the target population is willing to participate in.

Purpose

The purpose of this descriptive study was to assess the information and training needs of agricultural faculty related to distance teaching and learning, and to compare needs of faculty in 1862 land-grant universities, 1890 land-grant universities, and non-land-grant colleges and universities.

Procedures

The population for this study consisted of academic deans and selected faculty in all colleges and departments of agriculture in the United States and its territories who were interested in a distance education training opportunity for agricultural faculty. These colleges and departments of agriculture were found in 50 1862 land-grant universities, 17 1890 land-grant universities, and 61 non-land-grant colleges and universities.

To assess the information and training needs of agricultural faculty related to distance teaching and learning, a list of potential training topics was composed by the researchers after conducting a careful review of the literature. Ultimately, 22 topics were organized into a Likert-type scale with response categories that ranged from very low priority (1) to very high priority (5). The instrument was reviewed for content and face validity by a panel of agricultural educators at an 1862 land-grant university, an 1890 land-grant university, and a non-land-grant university.

Data were collected by mailed questionnaire in the Spring of 1996. All academic deans associated with colleges and departments of agriculture in the United States and its territories received a package containing a cover letter, three copies of a newsletter that explained the distance education training opportunity, three copies of the questionnaire,

and three postage paid return envelopes. The academic deans were asked to read the newsletter and complete and return one copy of the questionnaire. Academic deans then were asked to select two professors from their department or college who were interested or involved in distance education and send to them a copy of the newsletter, the questionnaire, and a postage-paid envelope. A copy of the newsletter and a cover letter were sent to all department heads in agricultural education. The department heads were asked to promote the training opportunity with their academic deans and encourage them to respond to the survey. One complete follow-up of nonrespondents was completed one month after the initial mailing. This follow-up was conducted through electronic mail and by telephone. No procedures were undertaken to control for non-response error. It was reasoned that deans and faculty who responded represented those who were interested in the distance education training opportunity for agricultural faculty. Coaxing a response from faculty who were not interested in distance learning would have yielded inappropriate data for use in decision making about faculty development programs. A total of 158 deans and professors from 72 different colleges or universities (36 1862 land-grant universities, 9 1890 land-grant universities, and 27 non-land-grant colleges or universities) provided data for this study.

Data were analyzed with the SPSS personal computer program. Means, standard deviations, and rankings were used to summarize the data. Data provided by deans and professors were analyzed together, and the deans and professors were collectively referred to as faculty.

Results

Table 1 shows the means, standard deviations, and rankings for 22 distance education topic areas by type of institution. Ratings varied considerably among the three groups. For example, the 1890 land-grant universities rated 11 topics above 4.00 on the five-point scale, while non-land-grant colleges and universities rated 8 topics at this level or higher. Only four topics were rated above 4.00 by agricultural faculty at 1862 land-grant universities. Topics were ranked based upon their mean ratings within each group. When rankings were used as the basis of comparison, the three groups provided fairly consistent assessments as to the importance of the 22 distance education topics.

Teaching techniques for distance education was the only topic that received a mean rating above 4.50 (very high priority). Most of the topics were judged to be of moderately high priority (mean scores between 3.50 and 4.49) by the agricultural faculty who participated in the study. Six topics were considered of average priority (mean scores between 2.50 and 3.49) by 1862 land-grant university faculty, two were of average priority for 1890 land-grant university faculty, and three were of average priority for non-land-grant college and university faculty.

Table 1
Descriptive Data for Importance of Selected Distance Education Topics by Type of Institution

	Type of Institution								
	1862 Land-Grant (n=80)			1890 Land-Grant (n=19)			Non-Land-Grant (n=59)		
Topic	Mean	SD	Rank	Mean	SD	Rank	Mean	SD	Rank
1. Teaching techniques for distance education	4.41	.96	1	4.56	.86	1	4.64	.66	1
2. Enhancing interaction in distance education	4.33	1.00	2	4.28	.89	7	4.29	.85	2
3. Learner-centered teaching techniques	4.16	1.12	3	4.37	.83	4	4.04	1.05	7
4. Designing instruction for credit courses	4.06	.91	4	4.42	.90	3	4.07	1.01	6
5. Models of effective distance teaching	3.96	1.01	5	4.37	.76	4	4.15	.96	5
6. Developing innovative multimedia presentations	3.95	1.10	6	4.11	1.24	9	4.20	1.01	4
7. Principles of teaching at a distance	3.93	1.15	7	4.47	.70	2	4.27	.96	3
8. Understanding distant learners	3.85	1.11	8	3.58	1.07	17	3.86	.95	10
9. Distance education and the Internet	3.83	.98	9	4.32	.75	6	4.03	.93	8
10. Evaluating distance teaching and learning	3.78	1.08	10	4.06	.94	10	3.68	1.02	3
11. Learning at a distance	3.71	1.04	11	3.79	1.13	12	3.88	1.04	9

(Table continued)

Table 1 (continued)

Topic	Type of Institution								
	1862 Land-Grant (n=80)			1890 Land-Grant (n=19)			Non-Land-Grant (n=59)		
	Mean	SD	Rank	Mean	SD	Rank	Mean	SD	Rank
12. Exemplary distance education programs	3.71	1.06	11	3.79	1.18	12	3.64	1.05	4
13. Selecting and using distance education software	3.58	1.08	13	4.21	.71	8	3.73	1.26	2
14. Evaluating distance education programs	3.58	1.04	13	3.74	1.05	15	3.58	1.04	5
15. Assessing the demand for distant learning opportunities	3.56	1.09	15	3.79	1.23	12	3.74	1.13	1
16. Designing instruction for non-formal groups	3.51	1.17	16	3.56	1.10	20	3.24	1.02	2
17. Understanding distance education and its potential	3.35	1.07	17	3.58	1.43	17	3.56	.99	17
18. Copyright issues in distance education	3.29	1.22	18	3.16	1.42	22	3.41	1.22	20
19. Managing a distance education program	3.25	1.26	19	4.05	1.18	11	3.53	1.10	8
20. The distance education delivery team	3.22	1.03	20	3.63	1.11	16	3.58	1.10	5
21. The role of site facilitators	3.16	1.02	21	3.58	1.07	17	3.53	1.06	8
22. Selecting and using distance education hardware	2.96	1.23	22	3.47	1.07	21	3.25	1.23	21

Note: Based on scale: 1 = very low priority; 2 = moderately low priority; 3 = average priority; 4 = moderately high priority; 5 = very high priority.

The highest rated information and training needs of faculty at 1862 land-grant universities were (1) teaching techniques for distance education, (2) enhancing interaction in distance education, (3) learner-centered teaching techniques, (4) designing instruction for credit courses, and (5) models of effective distance teaching. Faculty at 1890 land-grant universities rated (1) teaching techniques for distance education highest, followed by (2) principles of teaching at a distance, (3) designing instruction for credit courses, (4) learner-centered teaching techniques, and (5) models of effective distance teaching. Faculty at non-land-grant colleges or universities identified (1) teaching techniques for distance education, (2) enhancing interaction in distance education, (3) principles of teaching at a distance, (4) developing innovative multimedia presentations, and (5) models of effective distance teaching as their highest priority information and training needs.

The topics given the lowest priority ratings by faculty at 1862 land-grant universities were (1) selecting and using distance education hardware, (2) the role of site facilitators, (3) the distance education delivery team, (4) managing a distance education program, and (5) copyright issues in distance education. Lower priority topics as perceived by 1890 land-grant university faculty included (1) copyright issues in distance education, (2) selecting and using distance education hardware, (3) designing instruction for non-formal groups, (4) the role of site facilitators, (5) understanding distance education and its potential, and (6) understanding distant learners. Faculty at non-land-grant colleges and universities perceived the following topics to be of lowest priority: (1) designing instruction for non-formal groups, (2) selecting and using distance education hardware, (3) copyright issues in distance education, (4) the role of site facilitators, and (5) managing a distance education program.

Conclusions/Recommendations/Implications

Agricultural faculty placed greater emphasis on planning and teaching behavior topics than on learning and learner-related topics. Faculty were most interested in teaching techniques, models of effective teaching, principles of teaching, and designing instruction for credit courses. This is not surprising because distance education is a relatively new phenomenon to agricultural faculty. Glickman (1990) summarized literature related to the developmental stages through which teachers progress. Glickman noticed that beginning teachers have an egocentric motivation for teaching that revolves around survival and security. Once the teacher has been assured of their security they begin to be concerned with providing effective instruction for their group of learners (group motivation) and ultimately reach a stage of altruistic motivation. At the altruistic stage, teacher concerns expand from their group of students to include concern for all students. Glickman noted that teacher development may ebb and flow. When confronted with an unfamiliar situation, teachers may regress to a lower level of development until they are comfortable with the new situation. A follow-up study of the needs of agricultural

faculty should be conducted in five years to determine if they have reached a level of development at which their concerns focus more on student issues.

Data provided by this group of agricultural faculty suggest that training programs should emphasize distance education for credit courses. Designing instruction for non-formal groups received relatively low ratings from all three types of institutions represented in the study but was rated lowest by non-land-grant universities.

The lowest-rated topics for faculty development related to administrative and technical concerns. Faculty were least interested in distance education hardware and software; planning, managing, and evaluating distance education programs; and the role of site facilitators and other support staff. As they should be, faculty were most concerned about teaching and learning related issues. Perhaps faculty plan to rely on technical support and administrative support systems in delivering distance learning opportunities to students.

Another topic rated relatively low for importance was understanding distance education and its potential. Agricultural faculty who responded to this survey have likely developed an interest in and basic understanding of distance education. They need not be further sold on its virtues and potentialities. This group of faculty may be more interested in practical information on how to use distance learning systems most effectively.

The data presented here would be useful to anyone planning a faculty development program in agricultural distance education. The results have direct implications for the USDA Higher Education Challenge Grant-supported project referred to earlier. The results were used to select program topics for five two-hour satellite broadcasts on distance learning. One project director from each type (1862 land-grant, 1890 land-grant, and non-land-grant) of institution with colleges or departments of agriculture comprised a committee to select program topics. The five programs include (1) focusing on the distant learner, (2) planning for instruction at a distance, (3) presenting instruction for distance learning, (4) developing innovative multimedia presentations, and (5) models of effective distance teaching. Enhancing interaction and use of the Internet were selected as crosscutting themes to be integrated into all programs. The programs emphasize topics that were important to potential participants including an emphasis on teacher-centered issues.

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PRIORITY TOPICS FOR FACULTY DEVELOPMENT
IN AGRICULTURAL DISTANCE EDUCATION

A Critique By:

Dann E. Husmann
Assistant Professor
South Dakota State University

Presentation and Execution of the Research

The article is well written and well organized. The purpose of the study is clearly stated along with the specific objectives. There is adequate background information regarding distance education as it pertains to this study and the literature review appears relevant, well-focused, and sufficient. Tables and related findings are well-designed and easily understood.

The approach and methodology the researcher designed were properly implemented and described in the paper. The population was appropriately and adequately described providing the reader a clear picture of the participants in this study. Some questions would be: 1) What were the literature sources that provided the study with a list of potential training topics? and 2) Describe the rationale used to conclude that only deans and faculty who responded were interested in distance learning. Was there a follow-up on the non-respondents to make this determination?

The findings were adequately described but in the conclusion section, the researchers state that agricultural faculty placed greater emphasis on planning and teaching behavior topics than on learning and learner-related topics. Was there a statistical test implemented that allowed the researchers to make this claim? Later in the discussion it is claimed that faculty were most concerned about teaching and learning related issues. How does this statement support or contradict the earlier statement?

I commend the researchers for furthering the body of knowledge in distance education, but the study lacks the support of findings within faculty development research. This support or expansion of distance education faculty development is critical as institutions continue to experience shrinking budgets and decreased federal and state support.

Logic of the Research

The methodology of the study flows logically from background information and literature review into the purpose statement and objectives. The researcher clearly maintains his discussion and findings within the bounds of the study.

Significance of the Research

The article contributes to the growing and needed body of knowledge in distance education. I commend the researchers for their contribution to the research base in distance education. As institutions of higher education continue to develop and offer programs via distance education technologies, more research will be needed in the areas of faculty development and its relationship to the overall mission of the institution.

INTERACTION NEEDS OF DISTANCE LEARNERS: SYNCHRONOUS VERSUS ASYNCHRONOUS

W. Wade Miller, Professor
Jill King Webster, Graduate Assistant
Timika Gray, Graduate Assistant
Department of Agricultural Education and Studies
Iowa State University

Introduction

Making education accessible to adult learners through the use of communication technologies and instructional systems has certainly brought a change in education, and agricultural education programs are no exception. The use of distance education in agricultural education has increased the educational opportunities for many adult learners. Agricultural educators use distance education to provide educational opportunities to adults who would not otherwise have access due to the constraints imposed by work, family, and social commitments (Schoenfelder, 1995).

Because distance education is a growing alternative to traditional classroom instruction, a learner's ability to interact with the instructor is very important (Main, 1995). Acker and McCain stated that "interaction is central to the social expectations of education in the broadest sense and is in itself a primary goal of the larger educational process and that feedback between learner and teacher is necessary for education to develop and improve" (Acker & McCain, 1993, p.11). Kearsley (1995), stated:

> One of the most important instructional elements of contemporary distance education is interaction. It is widely held that a high level of interaction is desirable and positively affects the effectiveness of any distance education course. However, it is not clear from research or evaluation data that interaction does improve the quality of learning in most distance education programs (p.366).

Interaction has been described as important to the instructional process and as one of the central issues related to distance education today (Jackson, 1994; Main, 1995). The types and quality of interaction provided in distance education courses concerns educators because learner satisfaction and perceived learning are affected by interaction (Scholdt, 1995).

Today distance education opportunities are offered through a wide variety of media (Schlosser & Anderson, 1993). These media allow instructors to deliver their courses both live and delayed through the use of video storage mechanisms. This has led to the dividing of interaction in distance education into two categories; synchronous and

asynchronous. Willis defined synchronous interaction as being "real-time, live and conversation-like during the instructional setting," asynchronous as "delayed, before or after the instructional session (Willis, 1994, p.46)." Do interaction needs vary with delivery method? Can interaction take place in a delayed setting? Is interaction related to learner performance? Research needs to be conducted by researchers in this area that will enable educators to understand the interaction needs of learners and develop agricultural distance courses that will meet those needs.

Purpose and Objectives

The purpose of this study was to determine if synchronous versus asynchronous delivery methods affected perceived learner interaction needs and performance in agricultural courses taught via distance education through the Off-Campus Professional Agriculture Program at Iowa State University. The objectives are as follows:

1. Describe selected demographic characteristics of learners enrolled in courses offered through the Off-Campus Professional Agriculture Program.

2. Determine if synchronous versus asynchronous delivery methods affect learner interaction needs.

3. Compare learner performance to interaction needs based upon delivery method.

Procedures

The research undertaken was descriptive in nature. The population for the study consisted of all learners enrolled in distance education courses administered through the Off-Campus Professional Agriculture Program at Iowa State University during the Spring semesters of 1995 and 1996, and the Fall Semester of 1995. A census was used to collect data.

Data were collected on 313 students from the following courses: Applied Non-Ruminant Nutrition (AnS 512), Wildlife and Agriculture (A Ecl 130), Advanced Crop Management (Agron 542), Agricultural Safety and Health (AST 436X), Principles of Crop Production (Agron 114), Agricultural and Extension Education in Developing Countries (AgEdS 561), Fundamentals of Entomology and Pest Management (Ent 376), Leadership Programs in Agriculture (AgEdS 315), Agricultural Markets (Econ 334), Biochemistry and Biophysics (BB405), Vegetable Crop Production (Hort 471), Workshop in Statistics (Stat 493), Instructional and Organizational Problems of Beginning Professionals in Agriculture (AgEdS 511), Biochemistry (BB 404), Models of Community (Soc 533), and

Agricultural Meteorology (Agron 541). The courses were offered through traditional classroom format (face-to-face), over the Iowa Communications Network (ICN), and via videotape.

As a point of clarification to the reader, the ICN (Iowa Communication Network) is an end-to-end fiber optic digital transmission, error-free data transport, and sharp, crisp two-way voice communications. The network links Iowa's schools, public universities, community colleges, independent colleges, government offices and libraries. These facilities are available to Iowans through access points in each of the state's 99 counties, thus making everyone within 20 minutes of an ICN user site.

The questionnaire utilized in the study was developed by the researchers and consisted of an interaction statements section and a demographics section. Content and face validity were established by a panel of experts in agricultural education. A pilot test was conducted using past learners of distance education courses offered through the Off-Campus Professional Agriculture Program. Cronbach's alpha was used to estimate the internal consistency of the instrument. The reliability coefficient for the pilot test was .93. No changes were made to the instrument after the pilot test. The reliability coefficient was .95 for the Spring 1995 study respondents and .93 for the Fall 1995 and Spring 1996 respondents.

The 68 interaction statements were measured using a Likert-type scale which ranged from extremely negative (1) to extremely positive (8), and included a does not apply (9) response category. The statements were developed from a review of relevant literature and instruments used for similar purposes in other studies. Each statement asked the learner to read the statement and circle the number which represented the extent to which they felt the experience to be a positive or negative in relationship to their learning.

The questionnaire, along with a cover letter and a stamped return envelope, was sent to each learner. Ten days after the initial mailing a follow-up letter was sent to all non-respondents. Approximately one month after the first mailing a second complete mailing was sent to remaining non-respondents. Two hundred and twenty-one of the 313 learners completed and returned the questionnaire for a response rate of 71%.

Analysis of Data

All data were analyzed with the SPSS/PC+ computer program. Statistics used were frequencies, percents, standard deviations, ANOVA, and t-tests. The alpha level was set a priori at .05.

Results

The data collected from the respondents was placed in two groups for analysis depending on the delivery method by which the learners completed their course work: synchronous or asynchronous. The synchronous group included learners enrolled in face-to-face and ICN courses. It should be noted that the learners who took classes face-to-face did so in an ICN setting; they were the learners at the origination site for the course. Learners enrolled in videotaped courses accounted for the asynchronous group.

The learners who participated in the study ranged in age from 19 to 58 years. The mean age of learners was 35.60 with a standard deviation of 9.17. Seventy-six percent (168) of the learners in the study were male.

The learners indicated that 82% (178) of them were part-time learners. The learners were asked to report their current martial status. Sixty-six percent (146) were married, 28% (62) were single, and 5% (12) were divorced.

Table 1 shows that farming was the occupation of 33 % (57) of the asynchronous learners yet only 16% (7) of the synchronous learners were farmers. The synchronous learners were employed more often in agribusiness or agricultural education related occupations. Approximately 30% (66) of each group of learners listed "other" as their occupation due to the fact that they had more than one occupation. Generally they indicated that they farmed and earned income from some other agricultural occupation.

Table 1
Occupation of Learners Enrolled in the Off-Campus Professional Agriculture Program Based Upon Delivery Method

Occupation	Synchronous		Asynchronous	
	f	%	f	%
Farming	7	15.9	57	33.3
Agribusiness	10	22.7	44	25.7
Agricultural Extension	4	9.1	5	2.9
Agricultural Education	10	22.7	12	7.0
Other	13	29.5	53	31.0
Total	44	100.0	173	100.0

Table 2 shows that 61% of the synchronous and 70% of the asynchronous learners indicated that they enrolled in the courses to pursue a degree; however, many learners from both groups were interested in improving their business or career performance.

Table 2
Learners Reason for Enrolling in the Off-Campus Professional Agriculture Program Based Upon Delivery Method

Reason	Synchronous		Asynchronous	
	f	%	f	%
Pursuing a degree	26	60.5	117	70.1
To improve my business/ career performance	13	30.1	31	18.6
For personal interest/hobby	2	4.7	6	3.6
Other	2	4.7	13	7.7
Total	43	100.0	167	100.0

Table 3 reveals that 75% of the synchronous and asynchronous learners indicated that overall they were satisfied to very satisfied with their class. However, there was no difference in satisfaction based upon delivery method. The vast majority of learners (95%) indicated that they would take another course taught using distance learning.

The learners were asked to read sixty-eight interaction statements and circle a number, from one to eight, that indicated the extent to which they felt the statement was either a positive or negative learning experience. If the learner felt the experience did not apply to them, they were instructed to circle the number nine which represented "does not apply."

Table 3
Learners Overall Satisfaction With Their Off-Campus Professional Agriculture Program Class Based Upon Delivery Method

Satisfaction	Synchronous		Asynchronous	
	f	%	f	%
Very Dissatisfied	3	6.8	10	6.0
Dissatisfied	2	4.5	2	1.1
Somewhat Dissatisfied	1	2.3	10	6.0
Somewhat Satisfied	5	11.4	20	12.0
Satisfied	17	38.6	84	50.3
Very Satisfied	16	36.4	41	24.6
Total	44	100.0	167	100.0

Table 4 shows the learners responses to the 68 statements from the interaction scale. The majority of learners indicated that they felt that experiences aimed at interaction between the learner and instructor were slightly to very positively related to their learning. They also indicated that they felt instructor interest, teaching skills, and personal interaction with the learners aided the learning process. Opportunities to discuss assignments and/or course work with instructors was viewed positively by both groups of learners.

Table 4 also shows that learners taking courses asynchronously felt that self-regulation of learning was more important than did the respondents in the synchronous group. However, both groups indicated that being physically separated from the teacher did not pose a considerable challenge to learning. They also indicated that they felt personal enthusiasm for their classes was moderately to very positively related to their learning.

Table 4

Mean Scores for Selected Statements Related to Interaction by Delivery Method

Statement (in order of appearance on questionnaire)	Delivery Method	
	Synchronous	Asynchronous
Discussing class assignments with instructor during class time.	6.27	4.79
Talking informally with instructor.	6.53	6.50
Privately discussing course work with other learners.	6.29	6.12
Instructor makes eye contact with me.	6.53	6.43
Instructor treats some members of the class differently than others.	3.56	3.28
Class members talking during class (interrupting teacher).	3.62	3.32
Instructor shows personal interest in my class work.	6.55	6.54
Instructor ignores me during class.	3.00	3.03
Instructor uses a variety of audio-visual aids in class.	6.97	6.95
Poor instructor use of distance education technology.	4.18	4.47
Being physically separated from the teacher (such as being in a remote location).	4.54	5.07
Instructor provides learner(s) remarks concerning class.	6.71	6.68
Self-regulation (control) of learning.	6.36	6.51
Personal enthusiasm for class.	6.05	6.79
Instructor visiting off-campus site classes.	5.94	5.94
Help from remote-site technicians.	5.68	5.73
Scheduling time to work on class assignments.	5.91	5.94
Being the only learner at a remote site	4.43	5.16

Note: Based on Scale: 1= Extremely negative; 2 = Very negative; 3 = Moderately negative; 4 = Slightly negative; 5 = Slightly positive; 6 = Moderately positive; 7 = Very positive; 8 = Extremely positive

Scheduling time to work on class assignments was felt to be moderately positively related to learning by all the learners. The asynchronous learners indicated that they did not feel that learning individually was a hindrance to their education but synchronous ICN learners indicated a dislike for being the only learner at a particular learning site.

The effect of poor instructor use of distance education technology was felt to be slightly negative by each of the groups of learners, with the synchronous learners believing it to be most negative. The learners also felt that talking during class, being ignored by the instructor, and the instructor treating some class members differently than others was also negatively related to their learning.

After analyzing each interaction item individually a grand mean for interaction was obtained. However, when the interaction scale was compared to the learners' interaction needs based upon delivery method no differences were found.

Table 5 indicates that over 60% of asynchronous learners felt that items relating to interaction with the instructor did not apply to their learning. The asynchronous learners also did not indicate a need for as much guidance from the instructor as did their synchronous counterparts.

It was interesting to note that 42% of the asynchronous learners felt "using computers outside of class," did not apply to their learning experience while only 23% of the synchronous responded similarly. The asynchronous learners also demonstrated less of a need for involvement and support from their classmates as did the synchronous learners.

Seldom did the asynchronous learner indicate that a statement "did not apply" less frequently than did the synchronous learner. However, an example of one statement where the synchronous chose does not apply less often than the asynchronous learners was "program support staff."

Table 6 reveals that over half of the learners' received an "A" as their final grade for the course they took via the Off-Campus Professional Agriculture Program regardless of delivery method. An additional 20% (23) of the synchronous and 16% (26) of the asynchronous learners received a "B" as their final course grade. The asynchronous learner population also accounted for the largest percentage of learners reporting a grade of "Incomplete." Of the 29 learners receiving no grade, 83% (24) were learners who took their course via asynchronous delivery. However, when final course grades were compared to the learners' interaction needs based upon delivery method no differences were found.

Table 5

Interaction Statements Selected by Students' As Not Applying To Their Learning By Delivery Method

Statement (in order of appearance on questionnaire)	% Choosing "Does Not Apply" Synchronous	Asynchronous
Discussing class assignments with other students during class time.	2.3	62.2
Instructor makes eye contact with me.	22.7	64.5
Using computers outside of class	22.7	42.4
Having personal active involvement in the class.	6.8	49.4
Instructor provides students' guidance regarding class assignments.	4.5	23.4
Classmates enthusiasm for class.	4.5	41.9
Program support staff.	20.5	6.4
Peer evaluation of my class work.	38.6	62.0

Note: Based on Scale: 1= Extremely negative; 2 = Very negative; 3 = Moderately negative; 4 = Slightly negative; 5 = Slightly positive; 6 = Moderately positive; 7 = Very positive; 8 = Extremely positive

Table 6

Final Course Grades of Students Enrolled in the Off-Campus Professional Agriculture Program Based Upon Delivery Method

Grade	Synchronous f	%	Asynchronous f	%
"A"	23	56.1	97	59.1
"B'	8	19.5	26	15.9
"C"	4	9.8	15	9.1
"D"	1	2.4	1	.6
"F"	0	0.0	1	.6
"Incomplete"	5	12.2	24	14.6
Total	41	100.0	164	100.0

Conclusions and/or Recommendations

Educators of agricultural distance education courses should be aware of the differences in interaction needs of their learners. The results of this study indicate that the interaction needs of synchronous and asynchronous learners, while similar in general, vary based upon the delivery method used for the course.

Regardless of delivery method, the learners' enrolled in these classes were overall satisfied to very satisfied. Studies such as this one are valuable in documenting the desirability of distance learning. Biner, et. al, (1994) concluded that high learner satisfaction could benefit distance education by promoting distance education programs, motivating learners, increasing enrollment, improving learning, and decreasing attrition rates.

The data from this study suggest that instructors need personal contact with all learners regardless of delivery method. Instructors should use this personal contact to clarify course assignments and expectations. A study by Rodriguez (1995), found that learners and professors believed that such interaction enhanced communications, improved teaching and learner interest in content matter. The respondents also indicated a slight desire for interaction between learners regardless of delivery method. Teachers educators should be aware of this desire and plan activities which incorporate interpersonal interaction into their courses.

It was interesting to note that learners taking courses asynchronously did not perceive interaction to be as important to their learning as did learners taking courses synchronously. However, when the asynchronous learners expressed a need for interaction, their responses were similar to the synchronous learners. Adult distance education learners have been described as learners possessing strong motivation, study skills, and discipline (Schoenfelder, 1995). Perhaps those learners who possess these traits do not require as much interaction as learners without these traits. Although the asynchronous learners indicated a desire for more control over their learning than synchronous learners the researchers question whether or not these individuals might learn better if interaction was improved.

Additionally, might the lack of interaction in many distance education courses be part of the reason behind the high attrition rate commonly found in distance education? In this study 10% of the learners received no grade. Could this be attributed to a lack of interaction within their selected course. Also of concern is the fact that of the learners receiving no grade, 83% took their course asynchronously. Although the asynchronous learners indicated that they did not feel that interaction was as important to their learning as the synchronous learners, could a lack of interaction account for some of these learners not completing their course on time.

As distance learning becomes more common in education, interaction will become a more pedagogically important issue. Further research needs to be conducted with these populations to determine how differences in interaction needs, based upon delivery method, should be addressed by agricultural distance educators.

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INTERACTION NEEDS OF DISTANCE LEARNERS: SYNCHRONOUS VERSUS ASYNCHRONOUS

A Critique By:

Dann E. Husmann
Assistant Professor
South Dakota State University

Presentation and Execution of the Research

The researchers provide an adequate description of interaction related to distance education. The use of a pilot test was critical in the development of the instrument used in the this study, but this activity needs to be explained in greater detail. Of the 68 interaction statements measured in the study, how many came from the pilot test or other related interaction instruments? Participants were asked to provide a positive or negative response to each statement, what definitions did the researchers utilize in describing the difference between the two responses? Was negative
defined as a lower grade, satisfaction level, attitudinal response, or completion of the course? A description of the context of learning would have been helpful.

The researchers communicate no difference in satisfaction based upon delivery method between synchronous and asynchronous learners, what statistical test was used to make this determination? There are also statements related to differences between the two groups. Are these statements statistical different or different only in relation to mean differences? The method used to determine "differences" needs to be strengthened to meet statistical rigor and integrity.

There is reference to the effect of poor instructor use of distance education technology. Are the researchers stating the instructor's ability to use technology determines if s/he is poor or rich in delivery of instruction? With a definition of learning, this statement could be interpreted different ways.

Logic of the Research

The methodology of the study flows logically from background information and literature review leads well into the purpose and objectives of the study.

Significance of the Research

I commend the researchers for investigating an area of study increasing our understanding on the relationship interaction plays on teaching and learning via distance education technologies. Their suggestions for further research are concerns that agricultural educators need to address as we expand our educational programming to customers and clientele at remote sites. The researchers provide some interesting questions as college faculty are confronted with the challenge of less-personalized instructional delivery experiences. The distance education studies presented in this research conference continue to foster the demand for a greater understanding of how instructional delivery can be improved in teaching which utilizes distance education technologies.

MICHIGAN CITIZENS' KNOWLEDGE AND ATTITUDES OF GROUNDWATER STEWARDSHIP

Dave Krueger
Assistant Professor

Murari Suvedi
Associate Professor

Dixie Bettinghouse
Graduate Assistant

AEE Center for Evaluative Studies
Michigan State University

Introduction

In response to growing concern over the contamination of our groundwater, the Environmental Protection Agency (EPA) and individual states are working to identify and correct sites of contamination, and educate the public about the importance of saving this invaluable natural resource. Federal and state programs have helped to clean up many waters and slow the degradation of others, but government alone cannot solve this problem. Citizens must take on the responsibility to become informed of the issues that affect their water quality, local water resources, and the sources of their drinking water. Perceptions of the public must be understood in order to educate them about being part of the solution to clean up current pollution problems. Carriker, Purvis and Mapp (1990) stated, "Although agricultural impacts on water quality have been recognized for several decades, the current emphasis on agricultural contamination of groundwater and the increasingly negative view of agriculture and the land-grant colleges projected by the media and policy-makers attach a heightened sense of urgency to the issues." They also reported the critical role of education on the beliefs and perceptions to be communicated.

In 1993, Michigan's governor, John Engler, signed into law Public Act 247, the Groundwater and Freshwater Protection Act, and Public Act 248, which amended the Pesticide Control Act of 1976. The new groundwater legislation helps encourage safe farming practices. Central to P.A. 247 is a groundwater stewardship program administered by the Michigan Department of Agriculture (MDA), which promotes farmers' protection of groundwater from pesticides and fertilizer contamination. The MDA has developed and adapted a program structure to protect Michigan's groundwater and freshwater in coordination with federal agencies including the Natural Resources Conservation Service (NRCS), and the Farm Service Agency (FSA), state agencies such as the Michigan Department of Environmental Quality (DEQ), Michigan State University Extension (MSUE), and professional and industrial organizations. This program focuses on research, education and service. It began in 1994 and will continue through 2001. The long-range plan recognizes the need for shifting the program's efforts toward more direct service to the public. The program has formulated an integrated approach for demonstration, education and service that emphasizes its primary role as promoter of safe farming practices.

"Groundwater is a valuable, renewable natural resource that, if contaminated by economic activities, may be rendered a nonrenewable, unusable, and a mobile public hazard" state Crocker, Forster and Shogren (1991). In addition, Bouwer (1990) said the "prevention of groundwater pollution is much cheaper than restoring polluted aquifers. Often it is not only the aquifer that needs to be cleaned up."

To help combat the problems, the EPA, along with states such as Michigan, is taking steps to transform the Clean Water Act Section 305(b) process into one that provides comparable data with known accuracy. These steps include implementing the recommendations of the national 305(b) guidelines and implementing the Office of Water Monitoring's strategy. These efforts will foster consistency and accuracy among the states and allow sharing of data for watershed protection across political boundaries.

Napier and Brown (1993) reported that groundwater pollution is a people problem, because humans make the land use decisions that affect the quality of groundwater sources. They also reported that managers of land resources play a significant role in protecting groundwater from contamination by adopting farming systems that emphasize lower application rates of chemical inputs and use of tillage systems that facilitate use of available nutrients by plants. Their research indicated that the respondents were basically undecided about groundwater pollution. Respondents agreed "slightly" that groundwater pollution was an important environmental problem in their area. However, Ketchum Public Relations (1991) disagreed that agricultural fertilizers had significantly polluted groundwater supplies. They believe that the current state of the environment is more than a public issue -- it has become a personal problem. In proprietary surveys, majorities of consumers claim their health has been affected by deteriorating environments, including the poor quality of drinking water and the poor quality of the air we breathe.

Gillespie and Buttel (1989) researched farmers' attitudes toward government regulation of agricultural chemicals and found that "despite the growing importance of government regulation of agricultural chemicals, surprisingly few studies of farmers' orientations toward these regulatory policies have been conducted." The results of their research indicated that the best predictors of opposition to regulation are political liberalism and perception of potential negative side effects of agricultural chemicals and drugs.

Lichenberg and Lessley (1992) found farmers' perceptions of the extent of water quality problems are important because there is no basis for action if no problem is perceived. On the average, farmers believe that there are only slight problems with water quality at the farm level, slight to moderate problems in the local area, and definite but not severe problems at the state level. Findings suggested that water quality tends to be perceived as more of a concern elsewhere in the state than in a farmer's own area. "Water quality concerns often focus on cropland, but what happens right at the farmstead is the most likely source of contamination of that farm's drinking water," says Gary Jackson,

Farm-A-Syst Extension coordinator. The Farm-A-Syst program helps farmers analyze and reduce that pollution potential" (Lichenberg and Lessley, 1992).

According to Libby (1990), "Incentives to change behavior need not be monetary. An important rationale for collecting detailed data on groundwater pollution sources and impacts, along with the communication of results to involves parties, is to help polluters realize what they are doing to others. The concept of resource stewardship is founded on a personal value that the destruction of natural systems is basically wrong." This report also states that government-supported research and extension efforts by universities and other institutions need to develop information that is compelling enough to encourage change. Agricultural practices that cause less pollution result from public investment, and give water users options that they would not have otherwise.

Anderson (1990) indicated the existence of an adverse relationship between the perceived severity of soil erosion and water quality problems, and the proximity of the problems to the geographical location of the farmer. Better educated farmers, farmers who operated larger farms, farmers who had developed approved soil conservation plans and farmers who perceived more severe on-farm soil erosion problems tended to report greater use of soil conservation practices. These findings suggest the farmers differ in their perceptions of soil erosion and water quality problems, their attitudes toward soil conservation policies and their conservation behaviors.

Elnagheeb (1995) concluded that the willingness to change farm practices to protect groundwater was positively related to the farmer's perception of the seriousness of the pollution problem.

Purpose and Objectives

Program evaluation is an important component of the Michigan Groundwater Stewardship Program. To document the program's impact over time, a statewide study was conducted to establish baseline information on how Michigan citizens view groundwater issues and to determine their knowledge and attitudes about groundwater stewardship. The specific objectives of this study are:

1. To determine citizens' awareness and their level of knowledge about groundwater.

2. To determine the degree to which citizens are aware of various materials that could affect groundwater quality.

3. To find out how Michigan citizens perceive various land use practices that pose a risk to groundwater.

4. To develop strategies that effectively utilize the Michigan Groundwater Stewardship Program's limited resources to meet the needs of Michigan citizens.

Methods/Procedures

This descriptive survey used a one-shot case study, pre-experimental design. The one-shot case study is used as a minimum reference for guiding future research studies. The design does not control threats to internal validity, as stated by Campbell and Stanley (1963). However, because descriptive research seeks only to explore phenomena and gain new insights into current events in life, the use of the one-shot case study design was appropriate for this study. This study utilized a mail survey. The instrument was developed to assess the citizens' knowledge and attitudes about groundwater stewardship. Face validity of the instrument was established by professionals in the areas of evaluation and water quality. The questionnaire was edited and changed to reflect suggested improvements. The instrument was evaluated for content validity by a panel of experts familiar with water quality and evaluation. Changes were made to improve clarity and reduce ambiguity in certain questions.

Reliability of the instrument was established by pilot testing the instrument with 70 households not included in the study. Reliability was calculated using Cronbach's Alpha procedures. Reliability coefficients for various scales ranged from .72 to .96.

The target population for this study was all Michigan households. A stratified random sample of 200 urban and suburban households, 800 rural households and 400 farmers was drawn using the 1990 census.

Data were collected by administering a mail questionnaire using the Total Design Method (Dillman, 1978). A questionnaire, cover letter and a gift for filling out the questionnaire (jar opener) were mailed to the sample population on March 18, 1996. A follow-up postcard was sent on March 28, 1996. A second questionnaire accompanied by a cover letter was sent to the non-respondents on April 11, 1996. A third questionnaire along with a cover letter was sent to the non-respondents on May 10, 1996. Of the 1,400 surveys mailed, 150 (10.6%) of the surveys were deemed non-deliverable. Usable surveys from 663 households were received. This gave an overall response rate of 53%.

Non-response error was controlled by following the Total Design Method (Dillman, 1978). Returned questionnaires were coded by the date they were received. The survey data on selected variables from early and late respondents were compared using t-tests statistics. No significant differences existed between early and late responses, so results were generalized to the whole population. Miller and Smith (1983) stated, "research has shown that late respondents are often similar to non-respondents."

The survey instruments were analyzed using the Statistical Package for the Social Sciences (SPSS/PC+) (SPSS Inc., 1995) computer software program. Descriptive statistics such as frequencies, percentages, medians, means and standard deviations were used to analyze the data. Whenever questionnaires contained incomplete items, they were treated as missing values and were not counted toward the sample statistics. Qualitative analyses were performed for open-ended questions.

Results

The surveys were initially mailed to areas representing urban and rural households and farmsteads. The responses received also showed a fair distribution -- 32.9, 34.5, and 32.6 % of the respondents were from city or town areas, outside city or town but not on a farm, and from farms or ranches, respectively. Thus, it can be argued that the opinions contained in this survey represent the views of urban, rural and farm families. Analysis of the respondents' counties of residence also reveals that there was a fair distribution of the respondents and the views represented. Responses were obtained from 81 counties.

Most of the respondents were retired individuals, white collar job holders, and agriculturalist (Figure 1).

Among the responses received, 43.3 % of the respondents were in the age group of 45-64; 29.0% were older than 65 years; 26.9% were between 25 and 44 years and 0.8% were younger than 25.

The majority (91%) of the respondents had a high school diploma or advanced degrees. About 35% of the respondents were engaged in farming or production agriculture, which included row crops, fruits, vegetables, livestock/dairy, forages and poultry. Almost 63.2% of the respondents associated with farming were part-time farmers and 36.8% considered themselves full-time farmers. More than half of the farmer respondents had land holdings of 100 acres or less and about 10.7% had land holdings of more than 500 acres. Generally most the livestock owners had herds less than 50 animals. However a few farmers had herds numbering more than 500.

A general test conducted on the respondents' knowledge about groundwater and issues related to it showed that, most of the respondents were aware that groundwater in Michigan provides water to lakes and streams (Table 1). Likewise, most of the respondents disagreed with the statement that once the water reached the water table, the groundwater did not move, unless pumped. A majority (88%) of the respondents disagreed with the statement that water that looked clear and tasted good was safe to drink. Opinion seemed to be divided on whether groundwater, like surface water, flowed downhill. Forty-five percent of the respondents thought this to be the case, 32% thought this was not true and 23% were unaware about this pattern of movement of groundwater.

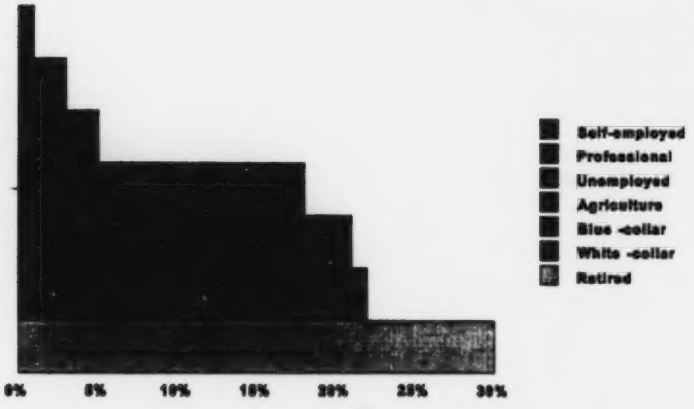

Figure 1. Occupation categories of the respondents

Table 1
Respondents' general knowledge about groundwater.

Statements	Disagree %	Agree %	Don't know %
Groundwater in Michigan provides water to lakes and streams.	9	**82**	9
Groundwater generally follows the contours of the land surface.	29	**57**	14
Irrigation and lawn watering can affect the amount of water leaching into the ground.	6	**86**	8
Once it reaches the water table, groundwater does not move, unless pumped.	**71**	12	17
Water that looks clear and tastes good is safe to drink.	**88**	3	9
Just like surface water, groundwater flows downhill.	32	**45**	23
It is more cost effective to prevent pollution of groundwater than to pay for the cleanup.	3	**92**	5
Less than 1 % of the earth's water is available for drinking.	10	**44**	46
An average American uses 50 gallons of water each day.	**16**	57	27
Groundwater in Michigan can best be described as an interconnected series of rivers, streams and caverns.	**11**	70	19
Groundwater in Michigan can best be described as a wet sponge where water fills the spaces between soil particles.	14	**61**	25
Approximately 50 % of Michigan's population relies on groundwater for drinking purposes.	10	**57**	33
The Groundwater Stewardship Program is a voluntary program that helps people select alternatives to reduce risk of groundwater contamination.	3	**46**	51

Note: The bolded cells represent percentage of correct answers.

Table 1 shows that a majority of the respondents agreed that it is more cost effective to prevent pollution of groundwater than to pay for cleanup.. The computation of the responses to the statement that less than 1% of the earth's water was available for drinking showed that 46% of the respondents had no knowledge if this was true. Forty-four percent agreed and 10% disagreed that this was true. About 57% of the respondents believed that an average American uses 50 gallons of water each day. About 16% did not agree with this statement and 27% admitted not knowing if this was true or false. A little more that half of the respondents agree that approximately 50% of Michigan's population relies on groundwater for drinking purposes. Likewise, 41% of the respondents agreed that the Groundwater Stewardship Program was a voluntary program that helped people select alternatives to reduce risk of groundwater contamination (Table 1).

Analysis of respondents' opinions on how land use patterns affected the groundwater of the nation as a whole showed that about 45% thought that it posed a high risk, where as 42% believed that it posed a moderate risk (Table 2). On whether land use patterns posed a risk to the groundwater of their home or property, 22% thought the risk was high, 28% indicated that they felt it caused moderate risk, 33% believed the risk was low and 17% thought that such practices would pose no risk at all to the groundwater of their home or property.

Table 2
Respondents' opinions about land use posing a risk to groundwater.

Location	High risk %	Moderate risk %	Low risk %	Not a risk %	Mean* (SD)
The nation as a whole	45	42	9	4	3.3 (.78)
Michigan	37	46	13	4	3.2 (.79)
Your county	35	40	21	4	3.1 (.84)
Your home or property	22	28	33	17	2.6 (1.0)

* Mean score was computed based on a scale of 4=high risk, 3=moderate risk, 2=low risk and 1=not a risk.

Views collected on the potential impact of various materials on groundwater quality of the respondents' area revealed that a majority of the people (58) thought that industrial chemicals had a very high impact (Table 3). About 17% thought that they had a moderate impact, 17% thought they had a low impact and 8% believed that industrial chemicals had no effect at all. Likewise a majority of the respondents (46%) also believed that fertilizers had a high impact on the groundwater quality of their area, 33% thought they had a moderate impact, 16% believed that they had only a low impact and 5% said they had no impact at all. Opinions on the use of insecticides, herbicides and fungicides were similar.

Table 3
Perceptions about various materials affecting groundwater quality in respondents' area.

Materials	**High impact %**	**Moderate impact %**	**Low impact %**	**No impact %**	**Mean* (SD)**
Industrial chemicals	58	17	17	8	3.2 (1.0)
Fertilizers	46	33	16	5	3.2 (.88)
Herbicides (weed control)	46	32	16	6	3.1 (.92)
Insecticides (insect control)	45	31	19	5	3.1 (.91)
Gasoline and oil	44	26	23	7	3.1 (.98)
Fungicides (disease control)	38	31	23	8	3.0 (.96)
Dry cleaning solvents	38	21	25	16	2.8 (1.1)
General use solvents (paint thinner)	35	25	28	12	2.8 (1.0)
Road salt	24	40	31	5	2.8 (.85)
Trash or garbage	23	38	30	9	2.8 (1.0)
Animal waste	16	32	42	10	2.6 (.88)
Medical waste	29	21	30	20	2.6 (1.1)
Water softeners	9	28	45	18	2.3 (.86)

* Mean score computed based on a scale of 4=high impact, 3=moderate impact, 2=low impact and 1=no impact.

Gasoline was considered to be a high impact factor in groundwater quality by a majority of the respondents (44 %). About 26% believed it had a moderate impact, 23% a low impact and 7% no impact. On trash or garbage as potential sources of groundwater quality contamination in the respondents' area, about 38% believed this had a moderate impact, 30% a low impact and 9% no impact. However, 23% still regarded this to be of high impact.

Responses were also collected on perceptions about effects of various land use practices on the groundwater quality of the respondents' area (Table 4). Computation and analysis of these perceptions revealed that industrial areas were considered to have the highest impact on the groundwater quality. On a scale of 1 to 4, 1 being no impact, 2 low impact, 3 moderate impact and 4 high impact. The mean rating for this source of impact was 3.1. About 48% of the respondents believed that industry had a high impact, 24% a moderate impact, 16% low impact and 12% no impact. Landfills were also considered a potential source of impact, receiving a mean score of 3.0 on a scale of 4. About 41% considered landfills to have a high impact, 29% a moderate impact, 19% a low impact and 11% no impact at all on the groundwater quality of their area. Agricultural areas were considered to have a moderate impact on the groundwater quality of their area by about 39% of the respondents, 25% considered this to have high impacts, 16% believed that it had a low impact and 8% considered agricultural lands to have no impacts at all on the groundwater quality of their area. Commercial lawn care was also believed to have a high impact on the groundwater quality by 26% of the respondents. About 35% believed this to have a moderate impact, 28% a low impact and 11% no impact at all in their area. Personal fuel storage was considered to have high impact on the groundwater quality of their area by 17% of the respondents; 28 and 36% believed this to have a moderate and low impacts respectively, while 19% considered it to have no effect at all in their area. Lawns and gardens were seen by most of the respondents (45%) as having low impact on the groundwater quality of their area. Thirty-one percent believed that they had a moderate impact and 15% no impact, while 9% regarded them to have a high impact in their area.

Table 4
Perceptions of land use and practices affecting groundwater quality in respondents' area.

Land uses and practices	High impact %	Moderate impact %	Low impact %	No impact %	Mean* (SD)
Industrial areas	48	24	16	12	3.1 (1.0)
Landfills	41	29	19	11	3.0 (1.0)
Gas stations	34	31	24	11	2.9 (1.0)
Agricultural lands	25	39	28	8	2.8 (.91)
Commercial lawn care	26	35	28	11	2.7 (.96)
Septic tanks	20	34	37	9	2.6 (.90)
Golf courses	19	33	34	15	2.6 (.96)
Roadside weed control	18	33	36	13	2.6 (.93)
Personal fuel storage	17	28	36	19	2.4 (.98)
Lawns and gardens	9	31	45	15	2.3 (.84)
Park lands	7	24	47	22	2.2 (.86)

* Mean score computed based on a scale of 4=high impact, 3=moderate impact, 2=low impact and 1=no impact.

Park lands were seen to have the least impact on groundwater quality-- on a scale of 4 it received a mean rating of 2.2. It was considered to have a low impact by 47% of the respondents, a moderate impact by 24% and no impact at all by 22%. However, 7% still reported that it had a high impact in their area.

Conclusions/Recommendations/Implications

Citizens' awareness and their level of knowledge about groundwater:

When dealing with groundwater knowledge, only 6 of the 13 questions received correct responses at a 60% level or higher. A statewide educational campaign needs to be established to educate Michigan citizens on issues that affect groundwater quality, local water resources, and the source of their drinking water comes from. In the absence of good educational programs citizens will not develop a sense of responsibility or be involved with the solution to help clean up current pollution problems.

Citizens awareness about various materials that could affect groundwater quality:

When dealing with materials that could impact groundwater quality, citizens believe most materials listed have a moderate impact. Only water softeners was perceived to have a low impact. Industrial chemicals, fertilizers, and pesticides were perceived to have a higher impact. Citizens seem to have a concern for materials that could potentially impact their water supply. Since pesticides and fertilizers are a concern of Michigan citizens, agriculturists need to be aware of the impact their practices have on groundwater and how their application decisions could impact groundwater contamination. Without agriculturists knowing the extent of water quality problems and perceiving a need, no basis for action would be established.

Citizens perceptions about various land use practices posing a risk to groundwater:

Citizens perceive land use posing less of a risk on their own property than their county, state, or nation. This is congruent with the findings of Lichenberg and Lessley (1992). All the listed land use practices were considered to have moderate impact with exception of personal fuel storage, lawns/gardens, and park lands which were considered low impact. Again, citizens seem concerned over land uses that could impact their water quality but didn't feel it was a big problem on their property. One respondent said "Someone should be watching over, the water of the earth, especially since we can spoil it with so many materials. A small farm like mine (milking 10 cows) is not a problem, but over 100 could be. There are ways to protect and we should." Citizens need to be informed that potential groundwater risks on all property leads to an overall county, state and national problem. Programs like Farm*A*Syst, Home*A*Syst and Field*A*Syst could alert citizens to these potential risks.

Strategies that effectively utilize the Michigan Groundwater Stewardship Program's limited resources to meet the needs of Michigan citizens need to be developed.

Not only do we need educational programs to alert adult citizens, but also need to develop experiential/teacher friendly curriculum for school aged children. This curriculum needs to be timely in addressing the real and perceived problems about our groundwater and make all citizens aware of the potential danger of over contamination of our groundwater.

This curriculum needs to be developed using a "hands-on" approach, not only utilizing the classroom, but also usable by service organizations such as 4-H, Boy and Girl Scouts or other audiences that teach children life skills.

The curriculum developed for classroom use, should include experiments to help learners understand the terms associated with ground water, as well as outdoor field trips and outdoor laboratories. These activities need to relate to the real world, as we know children learn best through experiences.

Delivery of this curriculum would be a major consideration throughout the development of it. Schools are bombarded with curriculum and state mandates. To be accepted it needs to meet the needs of the schools, have clear and concise objectives, be innovative and usable.

The implications of such an educational programs would not only educate the target audience, but through education help our children educate their families. This would bring about changes in not only the perceptions of our water supply, but also changes in our behaviors that effect this resource. Consequently, positive steps could be achieved in the stewardship of our groundwater.

As one respondent stated "Water is the most important substance we have. Nothing can live without it. We need to better ourselves on keeping our waters clean and free from pollution."

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MICHIGAN CITIZEN'S KNOWLEDGE AND ATTITUDES OF GROUNDWATER STEWARDSHIP

A Critique By:

Dr. Steven R. Harbstreit
Associate Professor
Kansas State University

The growing concern over the contamination of our groundwater and opportunities to influence the public's perception of the magnitude of the problem are important issues in agriculture and agricultural education. There are many areas of misinformation regarding the impact individuals can have on our groundwater. The purpose of this study was the evaluation of Michigan's Groundwater Stewardship Program.

The authors do a good job of reviewing the literature and developing the theoretical framework to support the need for the study. Additional information regarding exactly what has been done with the Michigan Groundwater Stewardship Program would have been helpful in understanding the structure of the questionnaire and responses given. Without this information, one can only assume that the questionnaire was valid. The purpose and objectives of the study were clearly defined and the research methodology clearly presented and appropriate for this study.

One question regarding methodology does come to mind after reading this study. How was the target population for this study determined? The authors indicate that a stratified random sample of 200 urban and suburban households, 800 rural households, and 400 farmers were drawn using the 1990 census. No indication of the total population in each of the areas was provided and no rationale was provided concerning the selection of sample size for each area. In addition no analysis except for percentage of respondents was conducted/presented using the stratified population areas. This raises a number of issues regarding the validity of this study. The sample size in each stratified sample area would not seem to reflective of the population. It is hoped this will be addressed during the presentation of this study.

The authors offer several conclusions regarding the awareness, perceptions, and effectiveness of the Michigan Groundwater Stewardship Program that would see to be appropriate. The only question remaining is "What are the next steps to be taken to improve individuals awareness and perceptions of issues related to groundwater quality?"

MOTIVATING AND RECOGNIZING ADULT VOLUNTEER 4-H LEADERS

Ken Culp, III
Assistant Professor and Extension Specialist, Volunteerism
The Ohio State University

Introduction

Volunteerism represents an American tradition of citizen participation in community affairs. History is full of examples of individual vigor and idealism mobilized within the structure of volunteer organizations and associations for the purpose of improving the quality of life within the American society (Bowen, 1981). Volunteerism embodies a spirit of willingness (even eagerness) on the part of volunteers to contribute their time, talents and energies without pay. There often is a strong willingness on the part of paid personnel to collaborate with volunteers on special projects (Murk & Stephan, 1990).

The literature on 4-H volunteers clearly indicates that the central and important role of these volunteers in the organization cannot be overemphasized. Two pertinent issues which need to be addressed regarding the role of volunteers include an understanding of why people volunteer and the establishment of a systematic program for volunteer development. Dolan (1969) identified seven sub-processes of volunteer development, which include identification, selection, orientation, training, utilization, evaluation and recognition. Recognition should be approached as a managerial responsibility and as a process rather than a product of volunteer management (Safrit, King & Smith, 1993; Vineyard, 1988).

Kwarteng, Smith, and Miller (1988) defined recognition as favorable attention given formally and/or informally, which provides a sense of appreciation, security and belonging. Recognition can be divided into two broad categories: intrinsic and extrinsic. Extrinsic recognition includes tangible, outward forms of recognition such as pins, certificates, and trophies. Intrinsic recognition involves less-tangible, inward forms of recognition including pride of accomplishment, self satisfaction and the volunteer's belief that they accomplished, contributed and made a personal improvement (Safrit, *et al.*, 1993).

Motivation is closely associated with recognition. Recognition is most effective when volunteers are given rewards which are significant, motivational, or meaningful to them. However, which *categories* of recognition are most significant and the *specific types* of recognition which are most meaningful seem to be an open debate. Recognition which is well-received and appreciated in one situation may not be the most appropriate or effective in another (Bruny, 1981; Holtham, 1989; Sergent & Sedlacek, 1989). Bruny believed that recognition given by and presented in front of peer volunteers, professional associates, friends and/or community neighbors is the most meaningful kind of

recognition. Several other researchers (Murk & Stephan, 1990; Steele, 1994; Zeutschel & Hansel, 1989) recommend extrinsic forms of recognition, such as: recognition nights, posters, pins, pictures, letters of support and appreciation, positive response from "clients," acceptance by other volunteers, and recognition by professionals. Extension professionals and 4-H volunteers alike consider "informal verbal recognition, praise and encouragement by others involved in the 4-H organization" as being the most important developmental factor (Kwarteng, *et al.*, 1988).

Volunteer retention efforts may be enhanced by altering the organization's task and reward structure to more effectively meet the needs and characteristics of its volunteers. Fitch (1987) reported that volunteers had both altruistic and egoistic reasons for service and suggested that providing rewards for volunteers may be the key to increasing the quality and quantity of volunteer involvement. Balenger, Sedlacek and Guenzler (1989) found that highly desirable volunteer activities could be used as incentives or rewards. Additionally, Zeutschel and Hansel (1989) found that special events, personal growth, a sense of achievement, new knowledge and insights, friendships, and social rewards were all seen as meaningful rewards for volunteers in Germany. Recognition is a reward of volunteering and a strong motivating factor for volunteer retention (Zeutschel & Hansel). Volunteers are very important to the 4-H Youth Development program. An important part of volunteerism is retention. Motivation and recognition are two key factors in volunteer retention. What motivation and recognition lead to volunteer retention in 4-H youth development? What types of recognition are most meaningful, appealing, and satisfying to volunteers?

Purpose and Objectives

The purpose of this study was to identify the motivators of adult 4-H volunteers, and the forms of recognition which were most *meaningful* and *appealing* to adult volunteer 4-H leaders. The objectives of this study were to:

- Identify the negative motivators which contributed to discontinuation of service as an adult volunteer 4-H Leader.
- Identify the most meaningful categories of recognition as perceived by adult volunteer 4-H Leaders.
- Identify the most appealing forms of recognition for adult volunteer 4-H Leaders.

Procedures

Population and Sample

The populations for this study included all current adult volunteer 4-H leaders in Indiana during 1994 (N=1055), and all former (non-continuing) adult volunteer 4-H leaders in Indiana who had provided short-term service (three years or less, within the past five years) before terminating their position (N=128). The sample of respondents was drawn from 13 randomly selected counties in a three layered stratification process: Cooperative Extension Service (CES) Area, County Population and Extension Agent/Educator Stability. Indiana's 92 counties are divided into ten CES Areas. County population included rural (<50,000 residents), suburban (50-100,000 residents) and urban (>100,000 residents). Extension Agent/Educator stability included low (counties with three or more Extension Agent/Educators within the past seven years), high (counties whose Extension Agent/Educator has served 20 or more years in the same county) and moderate (those counties where Extension Agents/Educators have served less than 20 years but have not experienced the high turnover). All current and former 4-H volunteers in the 13 counties were sampled comprehensively. The names and addresses of these two groups were provided by the County Extension Educator-4-H/Youth Development.

Instrumentation and Data Collection

Data were collected via two, four page survey instruments, one designed for current 4-H leaders and a second, with slight wording modifications, for former 4-H leaders. The surveys were adapted from two earlier questionnaires developed by Denmark (1971) and Parrott (1977). Validity was established by a panel of five experts, including Departmental Extension Coordinators, State 4-H Specialists, and Education Administrators. In addition, the instruments were field tested with a group of nine current and two former 4-H leaders for content validity and reliability; however, due to the low number of respondents in the field test, reliability could not be established. Reliability was established post hoc by administering the survey to a group of 201 4-H volunteers in Ohio. Cronbach alpha values ranged from .66 to .93 (with a mean of .82) for recognition, and .52 to .87 (with a mean of .69), .60 to .83 (with a mean of .75), and .58 to .81 (with a mean of .72) for initiation, continuation, and discontinuation motives, respectfully. The instruments contained 60 questions, 52 of which were quantitative and eight which were open-ended. Surveys were mailed to volunteers with follow-up postcards being mailed five weeks later to non-respondents. The final response rate was 46.83% for current volunteer leaders and 31.25% for former volunteer leaders.

Data Analysis

Statistical analyses included descriptive statistics utilizing SAS 6.0 (SAS, 1991) to identify differences in the two populations. An alpha level of .05 was set a priori. Responses from the open-ended section of the survey were coded according to key word identification. Trends emerging from the findings were grouped categorically and evaluated utilizing descriptive statistics.

Results

Motivators for Initiating Volunteer Service

Volunteers identified similar motivations to begin their service of volunteerism to the 4-H program, regardless of whether they became current continuers (those who volunteer for three years or more), or former non-continuers (those who discontinued volunteer service within three years or less) (Table 1). The primary motive both groups identified in a rank-order survey item was "My children were 4-H members" which is consistent with findings of Zeutchel & Hansel (1989) who identified "a distinct pattern of volunteering to be found in parents, mostly mothers, who accompany their children through different educational institutions..." This motive was followed by "I enjoyed 4-H as a youth," "4-H is a good organization," "4-H is good for the community," "I enjoy working with youth" and "Someone asked me to help."

From these similar motives, two issues become apparent: 1) Parents become involved because of their children's involvement, and 2) 4-H has established itself as a credible, worthwhile, beneficial organization which enjoys positive, influential name recognition and affiliation value. Almost no one began volunteering because they had extra time (although continuing volunteers perhaps have a different perception of time availability than do non-continuers), for self-improvement, because they hoped it would lead to employment or to make new friends. (On this item, respondents were asked to "rank the top five reasons which motivated you to begin serving" from a list of 13 items. Therefore, the "n" is different for each motive.)

Table 1
Motivators Which Encouraged Adult Volunteer 4-H Leaders to Begin Volunteering

	Current			Former		
Motivations to begin Volunteering as a 4-H Leader	n	Rank Mean	SD	n	Rank Mean	SD
Kids were 4-H members	339	1.82	1.24	24	1.83	1.24
4-H is a good Organization	416	2.76	1.19	34	2.85	1.21
Enjoyed 4-H as a Youth	253	2.79	1.42	20	2.40	1.39
4-H is good for Community	361	2.96	1.24	27	3.15	1.46
Enjoy working with Youth	343	3.04	1.28	27	3.11	1.12
Someone asked me to help	95	3.41	1.49	16	2.75	1.44
Liked sharing talents/interests	168	3.67	1.29	13	3.31	1.44
Wanted to help people	152	3.66	1.27	13	3.62	1.45
Sense of duty/obligation	116	3.69	1.29	9	4.00	1.00
Had extra time	18	3.89	1.02	7	4.43	0.79
Self-Improvement	34	4.06	1.30	3	4.00	1.00
Employment Opportunities	3	4.33	0.58	1	5.00	0.00
Wanted to make new friends	40	4.38	1.03	1	4.00	0.00
Other	27	3.33	1.69	1	1.00	0.00

Scale: 1= Primary Motivator, 2 = Secondary Motivator, etc.

Motivators for Continuation of Volunteer Service

This study upholds previous findings by Atkinson & Birch (1978), Henderson (1981) and Rouse & Clawson (1992) who observed that volunteers were motivated to serve by reasons which were issue/cause or affiliation based. The issue/cause identified by the majority of current leaders (61.12%) as the primary reason which prompted them to volunteer was a youth motive, although one could argue that the first six are all affiliation motives with youth or the 4-H organization. "My own children/ grandchildren are

involved," and "I enjoy working with youth" were the most common responses. An affiliation motive with the 4-H Organization was the second most common motive and was reported by 20.84% of the respondents. These leaders remarked that "I enjoyed 4-H as a youth," "I am loyal/dedicated to the 4-H organization," "I enjoy 4-H" and "I want to give something back to the 4-H Program." The third most common motive identified by 4-H Leaders was a feeling of being needed. "I feel needed by my 4-H members," "Without my involvement/service, my 4-H club would disband", "I provide needed information and service" and "I was asked/the Leader needs me" were frequent responses (Table 2). (On this item, respondents were asked "What motivates you to continue serving as a 4-H leader?" and were provided space to rank their three most important continuation motives, qualitatively.)

Table 2

Motivators Which (Would Have) Encouraged 4-H Leaders to Continue Volunteering

Motivators	n	%
Current Volunteers		
Youth	261	61.12
4-H Organization	89	20.84
Feeling Needed	45	10.54
Community Service	13	3.04
Feeling Appreciated	10	2.34
More Available Time	6	1.41
Nothing	3	0.70
Total	**427**	**100.00**
Former Volunteers		
More Adult & Parental Support	12	37.50
More Available Time	6	18.75
If My Children Had Stayed in 4-H	3	9.38
If Club Members Were More Involved	3	9.38
Needed Child Care	3	9.38
Work/Scheduling Conflicts	2	6.25
Nothing	2	6.25
Compensation	1	3.13
Total	**32**	**100.00**

Negative Motivators Contributing to Discontinuation of Volunteer Service

The two factors most frequently reported by current leaders which would cause them to resign their position were similar to those factors which motivated former leaders to terminate their service of volunteerism (Table 3). A lack of assistance (in the form of an assistant leader or volunteer assistance from 4-H members' parents) which most volunteers associated with feelings of being unwanted or unneeded was the response cited most frequently by both former and current leaders (30.56% and 34.35%). Similarly, time/employment conflict (25.00% and 24.30%) was the second most important category. Former leaders were twice as likely to leave the volunteer pool when their own children left the 4-H program than were current leaders (19.44% vs. 10.28%). Additionally, more former leaders cited "conflicts" than did current leaders (13.89% vs. 10.05%) as a negative motivator. Finally, many 4-H volunteers (10.51%) stated that poor health, old age or only death itself would cause them to resign their 4-H volunteer position, while none of the former volunteers foresaw themselves committing that length of time to volunteering for 4-H. (On this item, respondents were asked "What might/did cause you to discontinue your service as an adult volunteer 4-H leader?" and were provided space to rank their three most important discontinuation motives, qualitatively.)

Table 3
Negative Motivators Leading to Adult Volunteer 4-H Leader Resignation

Negative Motivators	Current (n=494)	Former (n= 40)
No Assistance, Unwanted	34.35%	30.56%
Time/Job Conflicts	24.30%	25.00%
Kids Leave 4-H	10.28%	19.44%
Conflicts	10.05%	13.89%
Health, Age, Death	10.51%	0.00%
Other	4.21%	11.11%
Nothing	3.27%	0.00%
Lack State Support	3.04%	0.00%
Total	**100.00%**	**100.00%**

Similarity of Positive and Negative Motivators for Current and Former 4-H Volunteer Leaders

Both current and former 4-H Leaders identified similar motivations (Table 1) for continuation of volunteer service. Negative motivators which lead to volunteer leader resignation were found to be similar for current and former leaders (Table 3), with lack of adult assistance, lack of time / job conflicts and children leaving 4-H being the primary negative motivators. However, former leaders were nearly twice as likely to resign their volunteer position when their children left the 4-H program. Additionally, former leaders identified "conflicts" as a greater barrier to continuation of service than did current leaders. Finally, 10.51% of current leaders identified the category "health, age or death" as the only factor which would cause them to discontinue their service of volunteerism to the 4-H program; whereas none of the former leaders envisioned themselves participating in 4-H volunteer activities for that length of time.

Most Meaningful Recognition Categories of Adult Volunteer 4-H Leaders

Respondents were presented with six categories of recognition and were asked to rank all those which they felt were most meaningful to them (Table 4). Adult 4-H Volunteers overwhelmingly ranked "Recognition from 4-H Members" as their most preferred choice (1.6 mean ranking). This was followed by recognition given to 4-H volunteers by parents of 4-H members in their clubs or programs (2.27), with recognition provided by the Cooperative Extension Service Staff being third (2.60). Community-wide recognition was the fourth choice (2.90) with recognition from other 4-H Leaders being fifth (3.19). Volunteers identified being recognized in the news media as their least meaningful recognition form (with a 4.37 mean ranking). (Respondents were asked to rank recognition sources which they felt strongly about, from a list of six choices.)

Table 4
Mean Rankings of Most Meaningful Recognition Categories

Recognition Form	Frequency	Frequency Rank	Mean	Std. Dev.	Mean Rank
Member	396	1	1.60	0.99	1
Parent	309	2	2.27	1.06	2
CES Staff	243	3	2.60	1.36	3
Community	192	4	2.90	1.43	4
Other Leaders	169	5	3.19	1.39	5
News Media	106	6	4.37	1.84	6

Most Appealing Types of Leader Recognition

The most appealing specific types of 4-H leader recognition, as identified by the leader, were informal and largely intrinsic in nature (Table 5). Receiving a thank-you note or letter from 4-H members was identified as the most appealing type of recognition which 4-H leaders could receive (mean ranking of 2.08). A 4-H member's thank-you note or letter was also identified by the greatest number (238) of adult leaders as being the most appealing type of leader recognition which they could receive. Receiving a telephone call from a 4-H member was the second most appealing type of leader recognition both in mean ranking (2.44) and in frequency (f=188).

A formal awards banquet was the third most appealing type of leader recognition (2.53 mean ranking) but was seventh by frequency (148). Formal recognition banquets are very appealing to a small group of 4-H volunteers, but this formal means of recognition is less popular than the informal means of recognition provided by 4-H members: a thank-you note or telephone call. A visit from a 4-H member was the fourth most appealing recognition form (2.65 mean ranking) but it was ninth in the number of volunteers who identified it. Other appealing types of volunteer recognition included: recognition at an informal club meeting (2.91 mean ranking), at a club's recognition program/achievement night (2.95 mean ranking), a thank-you note or letter from 4-H members' parents (2.99 mean ranking), county fair recognition (3.00 mean ranking), a letter or thank-you note from CES Staff (3.01 mean ranking), and a telephone call from 4-H members' parents (3.05 mean ranking). (Respondents were asked to "rank your five most appealing forms of leader recognition" from a list of 16 choices.)

Table 5
Mean Rankings of Most Appealing Types of Leader Recognition

Recognition Form	Frequency	Frequency Rank	Mean	Std. Dev.	Mean Rank
4-Her's letter	238	1	2.08	1.33	1
4-Her phone call	188	2	2.44	1.23	2
Formal Banquet	148	7	2.53	1.62	3
4-Her's visit	100	9	2.65	1.43	4
Informal (mtg)	74	11	2.91	1.53	5
Club program	160	4	2.95	1.50	6
Parent's letter	170	3	2.99	1.91	7
County Fair	93	10	3.00	1.32	8
CES Letter	150	6	3.01	1.40	9
Parent's phone	166	5	3.05	1.10	10
Parent's visit	78	12	3.17	1.31	11
Plaques, Pins	131	7	3.24	1.33	12
Newspaper	22	15	3.24	1.32	13
CES visit	22	16	3.27	1.58	14
State Fair	54	14	3.30	1.37	15
CES phone call	66	13	3.45	1.25	16

Conclusions

Clary and Snyder (1991) suggest that a multi-motivational perspective known as "the functional approach" best conceptualizes volunteer motivation. The functional approach allows a person to fulfill a variety of important social or psychological needs. These needs serve as volunteer motives. It stands to reason, then, that identifying and serving these needs should be an integral part of developing an effective volunteer recognition program.

All volunteers identified similar motives for initiating 4-H volunteering. These included their own children's involvement in the 4-H Program, their own positive experiences as a 4-H member and their belief that 4-H was a good organization which also benefitted the community.

Current volunteers were found to be primarily motivated to continue serving as 4-H Leaders by similar issues which they identified as being responsible for prompting their volunteerism initially. The motive identified most frequently by all 4-H volunteers was "youth", followed by an affiliation motive with the 4-H Program, and because they felt needed.

Former volunteers identified completely different motives for continuation of volunteer service (which prompted discontinuation of volunteer service.) These included "more adult and parental support", "more available time" and the categories "If my children had stayed in 4-H", "If my club members had been more involved" and "If I would have had child care".

The primary motive for continuation of service by 4-H adult volunteers was the 4-H youth members. This confirms the work of many previous researchers (Henderson, 1981; Independent Sector, 1992; Parrott, 1977; Rouse & Clawson, 1992) which identified 4-H members as a leading motive for volunteers. Correspondingly, these volunteers also identified 4-H member-originated recognition as the most desirable recognition category. Additionally, the most appealing specific types of volunteer recognition were member-originated and included a thank-you note or card, telephone call and visit. The second most appealing recognition category was parental recognition. Specific types of appealing recognition forms included a letter, telephone call and home visit.

The mean rankings for specific types of leader recognition differed from the frequency rankings. A formal banquet, for instance, was ranked as the third most appealing type of volunteer recognition but was only seventh in the frequency rank, meaning that a formal banquet is a very popular form of recognition for a smaller number of volunteers. Similarly, a letter and telephone call of appreciation from parents of 4-H members received lower mean rankings but were third and fifth in frequency ranking, meaning that many volunteers identified them as important sources of recognition, but viewed them as being

of lessor importance than 4-H member originated recognition. Recognition forms which were extrinsic, formal or public were ranked lowest in both recognition categories and types in both mean and frequency rankings. The questions which therefore arise are: "Should extrinsic, formal or public recognition forms be offered as part of a volunteer recognition program on a continuing basis?" "Should these recognition forms, when already in place as a component of an ongoing volunteer recognition program, continue to be offered, but with less emphasis than informal, member-driven and originated recognition forms?"

In many county 4-H programs, the annual recognition banquet is the primary (or only) form of recognition provided to volunteers. While this is an important event for some volunteers, it is not a form of recognition which satisfies volunteer motivators. Member originated recognition does satisfy volunteer motivation and is one type of adult volunteer recognition which can be presented with little or no cost and may include a short note, telephone call, or personal visit. As Extension professionals, perhaps the most important way to recognize 4-H Volunteers is to actively encourage 4-H members to properly express their appreciation to 4-H volunteers personally and at their own club 4-H meetings.

Recommendations

All volunteers initiate their service to 4-H as an adult leader with similar motives: their own children being 4-H members, their own positive experiences with the 4-H program and their belief that 4-H is a worthwhile organization. Therefore, Extension Agents should recruit potential volunteers from an adult pool consisting of 4-H members' parents who were former 4-H members themselves. However, while the pool of volunteer leaders resulting from this recruitment strategy is likely to be retained longer, it should be pointed out that this strategy is not likely to assist the Extension Agent in broadening the diversity of the volunteer base.

1. The motives which 4-H adult volunteers identified as prompting them to continue their 4-H volunteerism were very similar to the most desirable categories and specific types of recognition which were identified as being most desirable. Therefore, the most effective means of recognition are those that serve, satisfy and fulfill the motives which drive or prompt the volunteering activity.

2. The primary motive which encourages 4-H volunteer leaders to continue their service of volunteerism is a youth (4-H member) motive which corresponds with the most desirable type and categories of volunteer recognition. The most effective means of recognition, therefore, will be recognition which is 4-H member driven and originated.

3. The single most important form of volunteer recognition which Extension Agents can provide is to encourage 4-H members to write a thank-you note, make a telephone call, visit the home of the volunteer leader, or provide recognition at a 4-H meeting or program.

4. When considering the initiation of a new recognition program which had not previously been in place, extrinsic, formal and public forms of volunteer recognition should not be implemented as the only components in a volunteer recognition model, particularly when they are the only types of recognition which are encouraged or provided.

5. Professionals should encourage those benefiting from a program to personally thank those volunteers with whom they worked, since personal recognition from the intended (members) audience was found to be most desirable, meaningful and motivating.

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MOTIVATING AND RECOGNIZING ADULT VOLUNTEER 4-H LEADERS

A Critique By:

Dr. Steven R. Harbstreit
Associate Professor
Kansas State University

Identifying the motivators of adults who volunteer their time has long been an issue with groups and institutions that depend on volunteers to deliver their programs. Identifying why adults volunteer and developing programs of support and training are critical to the long term retention of these adults and program effectiveness. The purpose of this study was to identify the motivators of adult 4-H volunteers and to assess the forms of recognition which were most meaningful and appealing to these adult volunteers.

The author provides an adequate statement of purpose and objectives and review of literature to establish the theoretical framework for this study. Procedures used in the study, instrument development and data collection processes were also provided. Some questions arise regarding the follow-up procedures used for non-respondents. It appears that only a follow-up postcard was used and no other attempts to obtain information from non-respondents was employed in this study. It would have seemed appropriate to send a second letter and survey instrument sometime after the postcard to improve the response rate of the study. It was also unclear how or why respondents were drawn from 13 randomly selected counties in a three-layered stratification process. What was the rationale for this method of selecting the population? All we are told is that there were 1055 current and 128 former adult 4-H volunteers. More information about the population would have been helpful.

The author offers several conclusions and recommendations resulting from this study. After reading the recommendations offered, this reader is left with the question "So what?" A number of years ago this reader participated in 4-H and later became an adult volunteer (my own children were involved in 4-H). 4-H members were taught to write thank you letters and encouraged to personally express their appreciation to those who were involved and provided assistance. These recommendations would not seem to be new or provide changes in accepted practice. How will the information from this study significantly alter the process of encouraging adult volunteers and affect current methods of recognition and support for these important individuals?

APPROPRIATENESS OF AGRICULTURE EDUCATION GOALS AND CURRICULUM CONTENT TOPICS IN RURAL ZIMBABWE HIGH SCHOOLS

Tabitha Madzura
Graduate Assistant

Robert J. Birkenholz
Associate Professor

Agricultural Education
University of Missouri - Columbia

Introduction

Food production is one of the greatest challenges facing Zimbabwe and many other developing countries. Constraints to food production in most developing countries are technical, social, as well as institutional. It has become imperative that countries utilize educational institutions by modifying agricultural education programs in order to train agricultural personnel who can effectively modernize the agricultural sector, and be able to adapt to changing technology. The challenge is to restructure the curriculum to meet developing aspirations and global challenges facing the agricultural sectors.

Agriculture education, therefore, has the potential for an enormous and long-term impact on agriculture and food production in Zimbabwe. Primary problems facing the country are insufficient food, high unemployment, high proportion of unskilled therefore unemployable school dropouts, teenage pregnancy and sexually transmitted diseases, high crime rates, and a significant number of homeless children roaming urban streets. There is also a tendency for high school graduates to migrate to urban centers looking for non-existent jobs (Todaro, 1992). Further, there is lack of applicability and relevance of agriculture education skills needed for students' to contribute to Zimbabwe's rural, agricultural economy.

To break the vicious cycle of unemployment and urban migration, this research was directed toward agriculture education programs in rural Zimbabwe High Schools. The study: (a) sought to determine if there was need to redesign agriculture education programs in Zimbabwe, based on the needs of the rural communities, industries, and the nation; (b) investigated how the agricultural education curriculum could be revised to provide for increased transference, motivation, and relevance for students; and (c) was aimed at evaluating the appropriateness of agriculture education programs in rural Zimbabwe high schools.

This research has significance in the area of school reform in general, but also addresses important issues in rural education, particularly as they relate to community and economic development in a developing country. Increasing food production above subsistence to a profit-making level is expected to improve the standard of living in rural areas, as well as contribute to rural economic development and help curb impending social problems. As a result, a program model that could be used to guide future program

modification efforts in order to improve food productivity, is being constructed based on the results of the research.

Theoretical Perspectives

In rural Zimbabwe, farms play an important role in providing food for 75% of the total (10,432,500) population and contributing to the nation's economic development. As such there is a need for a continuous supply of agricultural laborers. Obasanjo and d'Orville (1992) suggested that it was necessary for farm technologies to be intellectually satisfying and economically rewarding in order to motivate educated youth to stay in rural agricultural occupations. They further suggested that a knowledge-intensive agricultural system could generate considerable employment in secondary and tertiary sectors, and create skilled jobs for rural populations.

Swaminathan (1987) indicated that an integrated approach to on-farm and off-farm employment, traditional farming practices, and new technologies were urgently needed. Integration would help build skills in agriculture and other entrepreneurial activities. This also was expected to reduce economic and social problems prevailing in most rural areas of Zimbabwe (Bray, Clark & Stevens, 1986).

Several authors (Swaminathan, 1987; Malton & Spencer, 1984; Obasanjo & d'Orville, 1992; Khan, 1987) noted that rural high schools produced potential candidates for future agricultural occupations and the much needed agricultural labor force. Therefore, there was a need to evaluate and provide quality agricultural education programs in rural Zimbabwe. In an effort to improve total agricultural productivity, there needs to be increased emphasis on agricultural education programs in rural Zimbabwe secondary schools. However, additional emphasis on quality programs requires additional levels of funding support that carries an explicit assumption of program expectations. Therefore, a national program model was needed to guide future program development efforts to enhance the quality of secondary agricultural education programs in Zimbabwe.

Food and Agricultural Organization (FAO), International Labor Organization (ILO) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) (1989) identified major concerns regarding agricultural education programs in third world countries, including Zimbabwe. Education programs had been offered in Zimbabwe high schools more on an academic than a vocational basis. Freire (1970) observed that high school graduates possessed limited production skills that failed to contribute to gainful employment in agricultural occupations. Students graduating from rural Zimbabwe high schools had been motivated to pursue career opportunities in the urban sector. After graduation, these students tended to migrate to urban centers as soon as the opportunity arose (Todaro, 1992). Agricultural production and the farm labor pool had decreased. Therefore, Zimbabwe faces the likelihood of insufficient food production to meet future demand.

Agriculture education had been initiated to enable students to help increase food production and to boost the economy. However, little information was collected on the specific scope and purposes of agricultural education programs at the secondary school level in Zimbabwe. Furthermore, there was no clear indication of the desired outcomes regarding existing agricultural education programs in rural Zimbabwe high schools.

Purpose

The primary purpose of this study was to assess the appropriateness of secondary agricultural education program goals and curriculum content topics in rural Zimbabwe high schools. Perceptions of secondary agriculture education teachers and school headmasters were collected and assessed.

Specific research questions which this study addressed were:

1. To what extent are the goals of agricultural education programs appropriate for rural schools in Zimbabwe?

2. To what extent are the curriculum content topics appropriate for agricultural education programs in rural Zimbabwe?

Procedures

Population and Sample

The population for this study included all secondary agriculture education teachers and school headmasters in rural Zimbabwe high schools. Using Krejcie & Morgan's (1970) Determination of Sample Size for Research Activities procedure, a sample consisting of 300 schools (600 respondents) was needed to represent a population of 1,293 rural schools. This figure was increased by 200 schools (400 respondents) for a total of 500 schools (1'000 respondents). A larger sample was used to compensate for non-returns as some of the surveys were sent to areas with poorly developed communications and transportation infrastructure. This sample, stratified and proportional to the number of schools in each province, was randomly selected using Quattro Pro Data statistical sampling procedures.

Respondent subgroups were purposefully selected, in relation to the research topic. As reported in the Gwebi Agriculture Training College Prospectus (1980), postsecondary training for agricultural occupations is specific to agriculture related topics (farm management, crops and livestock production, agricultural engineering and irrigation). Therefore, because of their knowledge of the subject matter, agriculture teachers were more likely to understand and provide responses to the survey statements. School headmasters are responsible for the selection (from the national agriculture education

syllabus) of specific agriculture education curriculum content topics that should be taught at their secondary schools. This selection process is based on the availability of resources used in agriculture education programs (land, water, equipment, and human resources). In addition, the headmaster oversees the school's instructional program and performs teacher evaluations during the school term. These responsibilities qualified the headmasters to respond to the questionnaire.

Research Design

This study examined one independent variable and two dependent variables. The independent variable consisted of the professional position of the respondents; school headmasters and agriculture education teachers. The dependent variables consisted of responses to statements regarding the appropriateness of program goals and curriculum content topics in agriculture education programs in rural Zimbabwe high schools.

Instrumentation

Data for the study were collected via a mailed survey instrument consisting of three sections. Section one requested information regarding the appropriateness of goals of agriculture education programs in rural Zimbabwe high schools. Wettayaprasit (1992) reported a Cronbach's alpha reliability coefficient of .93 on the goals section of a similar instrument used in a study in Thailand. Section two requested responses regarding the appropriateness of curriculum content topics of agriculture education programs in rural Zimbabwe high schools. Both sections used a five-point Likert type scale (1 - Totally Inappropriate; 2 - Somewhat Appropriate; 3 - Appropriate; 4 - Very Appropriate; 5 - Absolutely Appropriate). The list of possible goal and curriculum content topic statements were derived from a review of literature. The third section consisted of eleven demographic statements regarding respondents, students, schools and provinces. The instrument was reviewed for content validity by agricultural education, international agriculture, and rural development faculty at the University of Missouri-Columbia. A field test of the data collection instrument was conducted involving University of Missouri graduate students from the African continent.

Data Collection.

Five hundred envelopes were mailed to randomly selected school headmasters between May 7-10, 1996. Two questionnaires were mailed in the same envelope, one to the headmaster and one to the agriculture teacher. Additional enclosures included a self addressed stamped return envelope, a letter of introduction, and instructions addressed to the Headmaster. Within two weeks of mailing, 224 schools had responded. Seven weeks after the initial mailing, 236 schools had responded. After 12 weeks (deadline for receipt of surveys) 271 schools had responded representing a 54% return rate.

Data Analysis

Descriptive statistics using the SAS program were computed to summarize and organize data collected during the study, answer research questions, and to describe characteristics of the respondents. Frequencies were computed for individual goal and curriculum content topic statements, gender, position, educational level, number of students, number of female and male students, number of students enrolled in agriculture, and number of female and male students enrolled in agriculture. A minimum mean importance score of 3.00 for each goal and curriculum content topic was used as the criterion for inclusion in the program model.

Results

Respondent Demographics

A total of 256 agriculture teachers responded to the survey. Twenty-two (8.6%) agriculture teachers reported having a secondary school certificate (equivalent to Grade 12 in U. S. A), and (7.8%) reported having a Higher School Certificate in Education (equivalent to 2 years of college education in U.S.A). Over half of the respondents (74.2%) reported having a Certificate of Teaching (3 years post secondary training), and the remainder (9.4%) reported having a university degree. About 79.6% of the respondents had 0-7 of years of experience in teaching, 18.4% had 8-17 years, and 2% had 18-27 years.

A total of 203 school headmasters responded to the survey. Twelve (5.9%) school headmasters reported having a secondary school certificate (equivalent to Grade 12 in USA), and 12 (5.9%) reported having a Higher School Certificate in Education (equivalent to 2 years of college education in U.S.A). Eighty-three (40.9%) reported having a Certificate of Teaching (3 years post secondary training), and the remainder 96 (47.3%) reported having a university degree. About 40.6% of the respondents had 0-9 of years of experience in teaching, 42.1% had 8-18 years, 15.3% had 19 - 27 years, and 2% had 28-36 years.

Student Enrollment

A total of 103,909 students were enrolled in schools that responded to the survey (Table 1). Of this figure 66,474 (65%) were enrolled in agriculture courses. Approximately one third (34%) of the students enrolled in agriculture were female (Table 2).

Table 1
Descriptive Statistics for Total Students Enrolled in Schools That Responded to the Survey. (N = 256)

	Mean	SD	Total
No. of female students	180.61	91.52	45,875
No. of male students	227.58	103.90	58,034
Total students	408.19	178.56	103,909

Table 2
Descriptive Statistics for Students Enrolled in Agriculture Education in Schools that Responded to the Survey. (N =251)

	Mean	SD	Total
No. of female Ag students	99.49	82.92	24,275
No. of male Ag students	170.16	97.65	42,199
Total Ag students	269.65	161.72	66,474

Research Question One

Research question one requested information regarding the extent to which the goals of agricultural education programs were appropriate for rural schools in Zimbabwe. Agriculture teachers and headmasters responded to 29 statements indicating their perception of the appropriateness of goals of agriculture education in rural Zimbabwe high schools (Table 3). Mean scores ranged from 2.53 to 3.87. The highest rated statement was "Provide effective field demonstration techniques", and the lowest rated statement was "Include aspects of the following subjects in teaching agriculture: History".

Table 3

Means and Standard Deviations for Possible Goals for Agriculture Education Programs in Rural Zimbabwe High Schools

Goal statement	N	Mean	SD
1. Prepare students for career opportunities in Agriculture	455	3.55	1.08
2. Prepare students for subsistence farming in communal areas	454	3.36	1.16
3. Provide instruction about agriculture for all secondary school children	452	3.31	1.10
4. Develop in students:			
(a) intellectual skills	451	3.71	0.93
(b) traditional social skills	455	2.73	1.10
(c) interpersonal relationship skills	454	3.26	1.03
(d) leadership skills	449	3.27	1.18
(e) entrepreneurship skills	436	3.45	1.16
5. Provide instruction about:			
(a) agriculture economics	455	3.71	1.01
(b) agribusiness	454	3.42	1.05
(c) creativity and innovation	455	3.53	1.04
(d) global agriculture	448	2.70	1.22
6. Encourage cooperation and communication among teachers, students and communal farmers	417	3.59	1.12
7. Provide:			
(a) effective classroom instruction	453	3.67	0.96
(b) effective laboratory instruction	452	2.56	1.15
(c) effective field demonstration techniques	453	3.87	1.03
8. Provide student groups for leadership development for agriculture students	447	3.27	1.06
9. Encourage students to develop practical experience programs supervised by a teacher outside of class time	452	3.82	1.04

(Table 3 continues)

Table 3 (continued)

Goal statement	N	Mean	SD
10. Include aspects of the following subjects in teaching agriculture:			
(a) Rural Sociology	443	2.87	1.12
(b) Rural/Community Development	452	3.39	1.04
(c) Chemistry	450	2.78	1.08
(d) Physics	453	2.62	1.14
(e) Biology	453	3.52	1.04
(f) Botany	448	3.46	1.07
(g) History	449	2.53	1.08
(h) Geography	452	3.45	0.95
(i) Zoology	449	3.01	1.13
(j) Mathematics/Arithmetic	449	3.27	0.97
(k) New Agriculture Technologies	453	3.79	1.12

Based on a Likert type scale: 1 = Totally Inappropriate, 2 = Somewhat Appropriate, 3 = Appropriate, 4 = Very Appropriate, 5 = Absolutely Appropriate.

There were 22 goal statements that received mean scores above the 3.0 threshold level for inclusion in the program model. Seven goals statements received mean scores below 3.0 and were not included in the program model.

Research Question Two

Research question two requested information on the extent to which a list of possible curriculum content topics for agricultural education programs were appropriate for rural schools in Zimbabwe. Agriculture teachers and headmasters responded to 42 statements to indicate their perceptions regarding the appropriateness of the curriculum content topics for agriculture education programs in rural Zimbabwe (Table 4). Mean scores ranged from 2.78 to 4.31. The highest rated statements were "Crop production - tillage practices: soil and water conservation", and "Animal sciences: poultry production". The lowest rated statement was "Rural Sociology: Family relationships".

Sixteen curriculum topics received mean scores of 4.00 or above. Another 25 curriculum topics received mean scores between 3.00 and 4.00. Two curriculum topics received mean scores below the 3.0 threshold, and were not included in the program model.

Table 4

Means and Standard Deviations for Possible Curriculum Content Topics for Agriculture Education Programs in Rural Zimbabwe High Schools

Curriculum Topic	N	Mean	SD
1. Soil and plant relationships:			
(a) Air and water	456	4.06	0.88
(b) Soil depletion and reclamation	455	4.13	0.90
(c) Importance of plants in soil formation	456	3.69	1.04
(d) Importance of soils - plant growth	449	4.28	0.81
2. Types of Crops			
(a) grains (maize, finger millet, sorghum, wheat, rice)	457	4.26	0.88
(b) legumes (peanuts, cowpeas, roundnuts, beans)	457	4.23	0.85
(c) cash crops (tobacco, sunflower)	456	3.89	1.09
(d) fruit and vegetables	455	4.30	0.82
3. Crop production:			
(a) seed selection	457	3.67	1.07
(b) planting techniques/mixed cropping systems	457	3.96	0.95
(c) diseases and insects	457	4.26	0.82
(d) harvesting and storage	452	4.11	0.88
4. Tillage practices:			
(a) land preparation	457	4.24	0.86
(b) soil and water conservation	457	4.31	0.85
(c) tillage practices (no-till, conservation tillage)	456	3.90	1.04
(d) soils and tillage implements	456	3.96	0.98
(e) plant and soil management	457	4.20	0.88
5. Animal Sciences:			
(a) animal selection (beef, dairy, goats, sheep, donkeys, pigs)	456	3.75	1.07
(b) anatomy & physiology	454	3.71	1.02
(c) breeding	457	3.79	1.07
(d) nutrition	455	4.00	0.92
(e) diseases and pests	456	4.08	0.91
(f) forage and pasture management	455	3.88	1.01
(g) poultry production	449	4.31	0.89

(Table 4 continues)

Table 4 (continued)

Curriculum Topic	N	Mean	SD
6. Farming areas/Agricultural holdings:			
(a) farm layout and location	455	3.35	1.10
(b) farm buildings	457	3.45	1.04
(c) water supplies	457	3.78	1.01
(d) access to markets	455	3.66	1.06
(e) families/farm labor	455	3.33	1.11
7. Environmental Sciences:			
(a) forestry, fisheries and wildlife	457	3.42	1.10
(b) natural resources - conservation	457	3.92	1.00
(c) land degradation/reclamation	454	4.00	1.01
(d) soil erosion/conservation	455	4.22	0.93
8. Rural Sociology:			
(a) community relationships	455	3.09	1.09
(b) traditional agriculture	455	2.88	1.10
(c) family relationships	454	2.78	1.11
(d) school and community	453	3.35	1.06
(e) agriculture and rural development	451	3.74	1.10
9. Agribusiness:			
(a) management/marketing agricultural products	456	3.70	1.07
(b) harvesting and storage of crops	456	3.82	1.00
(c) grading and transporting crops	457	3.51	1.08
(d) rural markets	457	3.44	1.12

Conclusions/Recommendations

Based on the findings of the study, the following conclusions were formulated:

Agriculture teachers and school headmasters as a group had positive responses regarding the appropriateness of goals of agriculture education in rural Zimbabwe high schools. These groups reported that 22 of the 29 goals statements were appropriate. Therefore, 22 goals were included in the model curriculum.

Agriculture teachers and school headmasters as a group had positive responses regarding the appropriateness of curriculum content of agriculture education in rural Zimbabwe high schools. These groups favored 40 out of 42 curriculum topic statements as being appropriate. Therefore 40 curriculum content topics were included in the curriculum model.

The following model was developed to guide program development and reform efforts in rural Zimbabwe high schools.

Most of the goals and curriculum content topics included in the model were already imbedded within the curriculum model in use. Despite the positive responses regarding the appropriateness of goals and curriculum topics, problems related to lack of interest of youth in agriculture, rural-urban migration, and decreased farm labor, still exist in rural areas. It is important that further studies be conducted to determine the effectiveness of instructional strategies used in agriculture education programs in rural Zimbabwe, the extent to which these goals and curriculum content topics are being implemented, and what constraints, if any, are being encountered in the instructional process.

Program Model for Agricultural Education in Rural Zimbabwe
Program Goals
1. Develop supervised practical experience programs for students outside of class time. 2. Provide effective classroom instruction and field demonstrations. 3. Develop intellectual, interpersonal, leadership and entrepreneurship skills of students. 4. Provide instruction about agricultural economics, agribusiness, creativity and innovation. 5. Encourage cooperation and communication among teachers, students, and communal farmers. 6. Prepare students for careers in agriculture. 7. Prepare student for subsistence farming in communal areas. 8. Provide instruction about agriculture for all secondary school students. 9. Provide an organization for leadership development of agriculture students. 10. Include topics related to new technologies, biology, botany, geography, rural/community development and zoology in teaching agriculture.

Unit	Curriculum Topics
Soil and Plant Relationships	Air and water, soil depletion and reclamation, importance of plants in soil formation, importance of soils - plant growth
Types of Crops	Grains (maize, finger millet, sorghum, wheat, rice); Legumes (peanuts, cowpeas, roundnuts, beans); Cash crops (tobacco, sunflower); fruit and vegetables
Crop Production	Seed selection, planting techniques/mixed cropping systems, diseases and insects, harvesting and storage
Tillage Practices	Land preparation, soil and water conservation, tillage practices (no-till, conservation tillage), soils and tillage implements, plant and soil management
Animal Sciences	Animal selection (beef, dairy, goats, sheep, donkeys, pigs); anatomy & physiology, breeding, nutrition, diseases and pests, forage, pasture management, and poultry production
Farming Areas/ Agricultural Holdings	Farm layout and location, farm buildings, water supplies, access to markets, families/farm labor
Environmental Sciences	Forestry, fisheries, wildlife, natural resources - conservation, land degradation/reclamation, and soil erosion/conservation
Rural Sociology	Community relationships, school and community; a
Agribusiness	Management/marketing agricultural products, harvesting, storage of crops, grading and transporting crops, rural markets

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APPROPRIATENESS OF AGRICULTURE EDUCATION GOALS AND CURRICULUM CONTENT TOPICS IN RURAL ZIMBABWE HIGH SCHOOLS

A Critique By:

Robert A. Martin
Professor
Iowa State University

Research in the area of curriculum development is very important if we are to organize the best possible educational program for students. Madzura and Birkenholz have provided another opportunity for the profession to analyze and discuss the content of the curriculum and evaluate its appropriateness for students. Although this study is focused on the agricultural education curriculum in high schools in Zimbabwe, there are implications to programs in agricultural education where ever they exist.

The researchers have appeared to follow all the correct procedures in this study. Also, I believe that the paper is well written and has provided some very good information to consider in curriculum development. The items in the model are helpful in providing insight on agricultural education in another country.

There are a number of questions that became evident in reviewing the paper. It might be useful to highlight these questions for the purpose of discussion. 1) What was the theoretical basis for the study? The section on theoretical perspectives failed to pinpoint the exact theory base for the study. There seemed to be considerable literature review on concerns about movement of students from rural areas to urban centers and the need for higher food production. This section of the paper appeared to be more of a rationale for the study than a theoretical frame; 2) How did the larger sample size help in your study if the communications and transportation infrastructure was poor? Wouldn't it be bad regardless the size of the sample? Does increasing the size of the sample decrease the effects of a poor communication and transportation infrastructure? The return rate of the questionnaires was 54%. It would be hard to say whether or not the return rate was improved by a larger sample size in this case. There was not indication in the paper how the returned questionnaires fit the stratification and proportions intended. Does this influence the results? What follow-up procedures were used? Did the study focus on the best data source for a study of this kind? 3) Could you tell us more about the instrument? What comparisons are there between agricultural education programs in Thailand and Zimbabwe? 4) Was the development of a model one of the purposes of the study? The model was not mentioned as an objective; 5)It seems contradictory to have promoted with literature review the issues of rural development and encouraging youth to stay in the rural areas and then eliminate the following concepts from the model because of rating below 3.0: traditional social skills, rural sociology, traditional agriculture and

family relations. 6) Were there any differences between headmasters and teachers? Were there differences by location? 7) Given the problems outlined in the introduction to the paper, how does this information help? It appears that nothing changed and the problems still exist. The study seemed to confirm the obvious. Teachers and headmasters like the curriculum as it is but there are still problems. More work needs to be done in this area of curriculum development and the authors are encouraged to investigate the topic further.

INFLUENCES OF AN ELEMENTARY AGRI-SCIENCE PROGRAM ON STUDENT PERCEPTIONS OF AND PERFORMANCE IN SCIENCE AND AGRICULTURE

Cary Trexler
Ph.D. Candidate

Murari Suvedi, Ph.D.
Associate Professor

Department of Agricultural and Extension Education
Michigan State University

Introduction

The National Research Council (1988) suggested that agriculture was too important to be taught to only those in vocational education. To teach more agriculture in the country's elementary schools, the Council suggested that:

> "Teaching science through agriculture would incorporate more agriculture into curricula, while more effectively teaching science" (p.11).
>
> "In many elementary schools, the most realistic way to teach science through agriculture is to introduce modules, or units of instruction that supplement and eventually replace existing curricula and textbooks" (p.13).

During the 1990's, many argued that a larger audience needed to be educated about agriculture and the human food system. Agricultural educators advocate the integration of agricultural concepts into the elementary school science curriculum (Trexler and Miller, 1992; Leising and Zilbert, 1994; Birkenholz et al., 1994; Frick, Birkenholz, and Machtmes, 1995.)

Concomitant to the agricultural education's move toward redefining its audience, the American Association for the Advancement of Science (AAAS) in Project 2061: Science for All Americans (1989) called out for increased scientific literacy. The Association suggested that most Americans are not scientifically literate because:

- Few elementary school teachers have even a rudimentary education in science.
- The present curricula in science . . . [are] overstuffed and undernourished.
- The present science textbooks and methods of instruction . . . often actually impede progress toward scientific literacy. (p. 14)

As a result of these parallel calls to action, practitioners began to explore ways to strengthen elementary teacher understanding of science concepts and to add relevance to science by creating curriculum based on food, agriculture and the environment.

In 1991 the Sanilac County Intermediate School District (SISD) embarked upon a program to improve both scientific and agricultural literacy by creating a process for teacher capacity-building and curriculum development. Grant proposals were written to carry out their plan. In the spring of 1991, SISD submitted a proposal to the W. K. Kellogg Foundation and received three years of funding beginning February 1992. The grant's overarching goal was to increase agri-scientific literacy among elementary students. Its intermediate goals were to:

- Increase awareness of the interrelationships between science, agriculture, and the environment;

- Develop a K-6 science curriculum based on food, agriculture, and the environment; and

- Empower K-6 teachers to deliver an agriculturally-based science curriculum.

To carry out the program, SISD hired staff with formal training and extensive practical experience in agricultural and elementary science education. The staff, in cooperation with teachers and principals, designed and conducted capacity-building activities for the rural, isolated school districts. These activities included, but were not limited to: 1) quarterly grade level inservices on science and agricultural concepts, 2) creation of a teacher-driven curriculum development process, 3) development of kits of materials, 4) updates for principals, 5) week-long summer workshops, etc.

As a result of these efforts, teachers taught nearly all state-mandated science objectives within the context of agriculture and natural resources. The K-4 curriculum included four thematic, eight-week modules supported with kits of hands-on manipulatives for each grade level. Grades five and six teachers were less amenable to curriculum integration, so more traditional curricula based on agricultural concepts were supplied. Curriculum development proceeded in the first year with grades kindergarten, three, and six. Grades two and four were introduced in the program's second year. In the program's final year of Kellogg Foundation funding, grades one and five were brought into the fold. Over the three-year period this research was conducted, 159 of the 161 treatment school teachers availed themselves of the program on a consistent basis.

Theoretical / Conceptual Framework

The work of Allport (1955) and Combs & Snygg (1959) in perceptions and personal meaning set the theoretical framework for this study. Combs et al. (1976) asserted that perceptions and personal meanings give direction to individual actions, choices and behaviors. This suggested that a student's interest in learning science through agriculture may be predicted by analyzing his/her beliefs about agriculture and science. Greenwald (1989) supported this theory, reporting that individuals with positive attitudes toward a subject or situation tend to evaluate it positively.

In science education, Yager & Penick (1986) reviewed the affective portions of the National Assessment of Educational Progress for 1977, 1982 and 1984. They noted that as students move from elementary to higher educational levels, their attitudes towards science becomes less positive. Science educators argue that the isolated, disassociated, and sterile way that science is most often taught diminishes student interest in the subject (National Center for Improving Science Education, 1989; AAAS, 1993; Roth, 1995). Yager and Penick (1986) suggest that, "when we begin teaching science dynamically, as it exists in the real world, and not as a static subject in tests and the minds of many teachers, we may see different perceptions by students" (p. 362). This view is also supported by agricultural educators (Budke, 1991; Trexler, 1994; Connors & Elliot, 1995; Mabie & Baker, 1996).

In agricultural education, little work has been conducted to ascertain perceptions of elementary students regarding agriculture. Despite this, Terry et al. (1992) found that elementary education student teachers with more knowledge about agriculture tend to have more positive perceptions toward agriculture.

Teaching science through the context of agriculture and natural resources is advocated by many agricultural educators in elementary as well as middle and high school. Research in elementary agri-science is limited. Mabie and Baker (1996) found that elementary students taught through experiential techniques in the context of agricultural out-performed a control group in articulating scientific process skills. Currently there is a dearth of knowledge about teaching elementary school science through an agricultural context. However, there exists some knowledge base at the middle and high school levels. Enderlin and Osborn (1991) and Whent and Leising (1988) found that students taught through agricultural examples perform at least as well, if not better, than students engaged in traditional science curricula. Connors and Elliot (1995) concluded that "high school seniors who had agriscience and natural resource classes performed as well as seniors who did not have agriscience and natural resources classes on [a] science achievement test" (p. 62).

A review of literature provides the following conceptual framework for this study. The framework in Figure 1 shows how teachers in an elementary school context can influence student perceptions of both agriculture and science learning, while promoting the acquisition of agricultural and scientific knowledge.

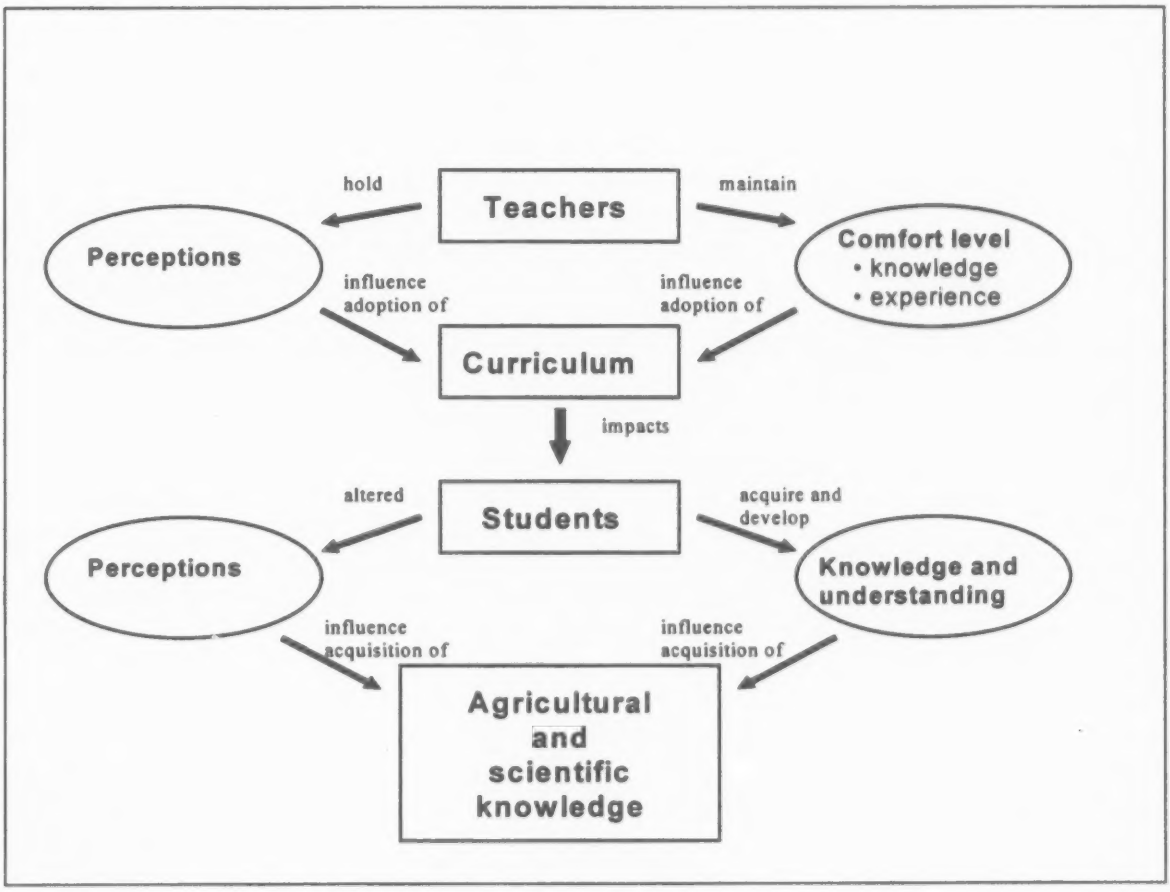

Figure 1. Conceptual Framework for Developing Curriculum to Increase Elementary Students' Agricultural and Scientific Literacy.

Purposes / Objectives

The study's purpose was twofold. First, it sought the perceptions of fifth grade students relative to science learning and agriculture and their knowledge of agri-science. Second, the study attempted to determine the affects of an agriculturally-based elementary science curriculum on student perceptions of science learning and agriculture as well as on their agri-science knowledge. The research questions addressed by this study were:

1) What were the 1992 perceptions of fifth grade students regarding science learning and agriculture in treatment and control groups?

2) What were the 1995 perceptions of fifth grade students regarding science learning and agriculture in treatment and control groups?

3) Do perceptions of science learning and agriculture differ between students participating in the agriculturally-based curriculum program and those not participating?

4) What was student agri-science knowledge level in both the treatment and the control group and how did it change over time?

Methods / Procedures

Population

The population for this study included all fifth grade students from eleven contiguous rural school districts in the central thumb area of Michigan. A representative sample of fifth grade students was drawn from seven Sanilac county school districts (treatment group). In order to compare student perceptions about science learning and agriculture and agri-science knowledge in similar settings, four school districts in Huron county were selected as a control. These school districts were similar with respect to school size, previous interventions in science education, community demographics, teacher educational level, economic base and per pupil spending.

Fifth grade students were selected because they were to receive three years of treatment. In addition, the Michigan State Board of Education requires this grade to take a standardized achievement test based upon the Michigan's model elementary science objectives. In 1992 there were 774 fifth grade students in these school districts, while in 1995 their number grew to 842.

Instrumentation

This study utilized a Pretest-Posttest Control Group Design (Campbell & Stanley, 1963). The researchers used Project 2061: Science for All Americans (1989), Michigan's Essential Goals and Objectives for Science Education (1991), and Understanding Agriculture: New Directions for Education (1988), the basis for the program's objectives, as a foundation for instrument development.

Data were collected via survey questionnaires. The instrument consisted of self-administered questionnaires with both closed and open-ended questions and was divided into three (3) sections. The first section, with twenty (20) questions, assessed student perceptions related to agriculture and science. The second addressed agri-science knowledge and contained twenty-seven (27) questions. The final section ascertained demographic information. The instrument was validated by staff members of the Department of Agricultural and Extension Education at Michigan State University and Sanilac ISD. Questionnaires took no more than 15 minutes to complete. A five-point Likert-type scale, with 1=never, 2=rarely, 3=sometimes, 4=usually, and 5=always, was used to measure perceptions and attitudes, while agri-science knowledge was assessed through "true-false" questions.

The instrument was field-tested to ensure usability and reliability. A Cronbach's alpha of (.60) and (.77) was determined for factors pertaining to perceptions about agriculture and science, respectively. Nunnally (1967) suggests that reliability coefficients of .5-.6 are acceptable in early stages of research. Factor analysis was conducted using the Rotation Varimax method to determine question items to be included in determining perceptions about science and agriculture. Eigenvalues greater than 1 were set a priori.

Data Collection

In May 1992, prior to the program's onset (prior to treatment), district superintendents and building principals were contacted to make arrangements for survey administration. Researchers administered the instrument to randomly selected 5th grade students who were stratified proportionally by school district. The researchers explained the purpose of the study to the students and stressed that all responses would be confidential. All data were collected within a one week time frame.

In May 1995, after three years of treatment, the researchers followed the exact same protocol to collect data to determine the program's impact.

Analysis of Data

Data were analyzed using the SPSS/PC+ computer software program. Frequency counts, percentages, means and standard deviations were used to describe findings. A *t* test statistic was used to determine significant differences between perceptions and agri-science knowledge, pre and post treatment, for control and treatment groups. An alpha level of 0.05 was set *a priori.* Whenever questionnaires contained incomplete items, they were treated as "missing values" and were not counted toward the sample statistics.

Results/Findings

Research Question One

What were the 1992 perceptions of fifth grade students regarding science learning and agriculture in treatment and control groups?

The findings of the 1992 base line study indicate that students in the treatment group schools had significantly more positive perceptions about science than students in control group schools. As shown in Table 1, learning science was "usually" fun for students, science was "usually" their favorite subject, and respondents in both groups felt that they were good science students. On a 1 to 5 scale with 1 being "never" and 5 being "always", the mean scores for these statements ranged from 3.53 to 3.75 and 3.11 to 3.35, for treatment and control schools, respectively. Students in treatment schools held more positive perceptions about science than those in control group schools. Similarly, students felt that "sometimes" science is boring to learn and being a scientist would be fun only "sometimes". Students from treatment schools had more positive perceptions about science and willingness to learn science through agricultural examples than students from control group schools.

Table 1
Student Perceptions about Science Learning

	Treatment				Control		
STATEMENTS	n	M	SD		n	M	SD
Learning science is fun.	212	3.75	.92		169	3.35	.91
Science is one of my favorite subjects to learn.	210	3.60	1.31		169	3.11	1.47
I am a good science student.	210	3.53	1.03		167	3.24	1.14
Being a scientist would be fun	210	3.50	1.32		169	3.05	1.44
I am looking forward to taking science classes in junior high and high school.	211	3.46	1.31		168	3.13	1.35

Scientific activities help me to test my ideas.	209	3.30	1.10		168	3.36	1.11
I like to learn science through agricultural examples.	209	3.21	1.21		166	2.92	1.19
Teachers encourage me to ask questions about science.	210	3.21	1.34		168	3.11	1.32
Composite score	196	3.46	.73		161	3.16	.75

Scale: 1 = Never, 2= Rarely, 3= Sometimes, 4= Usually, 5 = Always

Student perceptions about agriculture were assessed at both pre and post project periods. Mean perception scores for pre-project data are presented in Table 2. Students in both treatment and control schools "usually" believed that many agricultural jobs require an understanding of science and that research in science has improved agriculture. They "sometimes" felt agricultural jobs require much education; agriculture is more than farming and is part of science. Though statistically insignificant, students in control schools tended to possess more positive perceptions about agriculture than that of the control group.

Table 2
1992 Student Perceptions about Agriculture

	Treatment				Control		
STATEMENTS	n	M	SD		n	M	SD
Many agricultural jobs require an understanding of science	207	3.54	1.02		167	3.63	1.10
Research in science has improved agriculture	209	3.53	1.08		166	3.48	1.22
Agriculture is more than farming	206	3.34	1.27		162	3.23	1.43
Agriculture is part of science	210	3.31	1.01		167	3.68	1.13
Agricultural jobs require much education	209	3.16	1.27		166	3.22	1.40
Composite score	196	3.38	.62		154	3.47	.66

Scale: 1 = Never, 2= Rarely, 3= Sometimes, 4= Usually 5 = Always

Research Question Two

What were the 1995 perceptions of fifth grade students regarding science learning and agriculture in treatment and control groups?

The same instrument was administered to a similar sample of fifth grade students after the intervention, i.e., after three years. Findings on student perceptions of science are presented in Table 3. Again, students possessed a favorable attitude toward science. Findings suggest that students in both groups "usually" felt that they were good science students and that they enjoyed learning science. Further, they indicated that they "sometimes" looked forward to taking science classes in junior high or high school; felt scientific activities helped them to test their ideas and teachers encouraged them to ask questions. In general, treatment group students had a more positive perception about science than control group students.

Table 3
1995 Student Perceptions about Science Learning

	Treatment				Control		
STATEMENTS	n	M	SD		n	M	SD
I am a good science student	236	3.66	1.07		171	3.48	1.19
Learning science is fun	241	3.64	.85		173	3.39	.99
I am looking forward to taking science classes in junior high and high school	240	3.48	2.40		172	3.16	1.40
Scientific activities help me to test my ideas	241	3.45	1.13		171	3.51	1.17
Science is one of my favorite subjects to learn	240	3.42	1.36		171	3.15	1.38
Being a scientist would be fun	240	3.30	1.40		170	3.13	1.42
Teachers encourage me to ask questions about science	240	3.25	1.35		173	3.39	1.30
I like to learn science through agricultural examples	238	3.13	1.18		170	3.00	1.20
Composite score	228	3.45	.72		163	3.28	.83

Scale: 1 = Never, 2= Rarely, 3= Sometimes, 4= Usually, 5 = Always

Student perceptions about agriculture after the project are shown in Table 4. Findings indicate that students in both treatment and control groups had positive perceptions about agriculture. After a period of three years, students in treatment schools showed slightly more positive perceptions about agriculture, whereas there was a slight decrease in mean score for the control group students. However, the change in perceptions over the three year period was insignificant.

Table 4
1995 Student Perceptions about Agriculture

	Treatment				Control		
STATEMENTS	n	M	SD		n	M	SD
Agriculture is part of science	240	3.55	1.10		173	3.37	1.14
Many agricultural jobs require an understanding of science	236	3.49	1.09		169	3.44	1.12
Agriculture is more than farming	234	3.48	1.38		168	3.78	1.30
Research in science has improved agriculture	236	3.46	1.26		169	3.48	1.89
Agricultural jobs require much education	240	3.27	1.31		171	3.14	1.38
Composite score	222	3.46	.65		160	3.43	.74

Scale: 1 = Never, 2= Rarely, 3= Sometimes, 4= Usually 5 = Always

Research Question Three

Do perceptions of science learning and agriculture differ among students participating in the agriculturally-based curriculum program and those not participating?

In 1992, the perceptions of science learning and agriculture was significantly stronger among treatment group students than control group students. Similarly, in 1995 the treatment group perceptions remained stronger, although a slight strengthening occurred in the control group (Table 5). The t value indicates the differences in mean scores between treatment and control groups.

Table 5
Science Perceptions Composite Score Comparison

	Treatment				Control			
YEAR	n	M	SD		n	M	SD	t value
1992	196	3.46	.73		161	3.16	.75	3.80*
1995	228	3.45	.72		163	3.28	.83	2.12*

Scale: 1 = Never, 2= Rarely, 3= Sometimes, 4= Usually, 5 = Always
*significantly different at $p<.05$

Table 6 indicates that over the three year period, the mean perceptions about agriculture increased among treatment group students, while it declined among control group students. The change in perceptions, however, was not significantly different.

Table 6
Agriculture Perceptions Composite Score Comparison

	Treatment				Control			
YEAR	n	M	SD		n	M	SD	t value
1992	196	3.38	.62		154	3.47	.66	1.30
1995	222	3.46	.65		160	3.43	.74	.30

Scale: 1 = Never, 2= Rarely, 3= Sometimes, 4= Usually, 5 = Always

Research Question Four

What was student agri-science knowledge level in both the treatment and the control group and how did it change over time?

An agri-science knowledge test was designed to assess student knowledge level about agriculture as a science. As indicated earlier, the agri-science knowledge test consisted of twenty seven true-false questions. The test was administered to fifth grade students in both control and treatment schools at pre-and post-project periods. In 1992, the pretest scores ranged from 10 to 25 for the treatment group, while the control group scores ranged from 7 to 24. Three years later, scores ranged from 7 to 23 for the treatment group and from 10 to 24 for the control group. Mean test scores are presented in Table 7. Findings show that agri-science literacy level of students did not differ significantly between treatment and control schools and it did not change significantly over the three year period.

Table 7
Agri-Science Knowledge

	Treatment				Control			
YEAR	n	M*	SD		n	M*	SD	t test
1992 Test score	212	18.69	2.93		169	18.71	2.96	.05
1995 Test score	239	18.13	2.78		173	18.67	2.98	1.87

*based on a 27 question True-False agri-science knowledge test

Conclusions/Recommendations/Implications

This study found that fifth grade students in Michigan's rural "thumb" region hold positive perceptions about science. They believe that learning science is fun and that science is one of their favorite subjects. Similarly, they believe that agriculture is more than farming and is part of science. After exposure to an agriculturally-based curriculum in science for three years, treatment group student perceptions about science learning as well as about agriculture did not change significantly. Further, the level of agri-science knowledge among fifth grade students remained the same. Similarly, the control group's perceptions of science learning and of agriculture did not change significantly over the three year period, nor did their agri-science knowledge. To put it simply, introducing agriculturally-based curriculum, in this case, did not alter or negatively effect student perceptions of science, agriculture or their agri-science knowledge level.

A limitation of this study is that no attempt was made to distinguish between the level of adoption of the agriculturally-based science curriculum within treatment school district teachers. Further research be could conducted to ascertain the relationship between level of adoption and teacher perceptions about agriculture and teaching science through an agricultural context. Additional studies should be undertaken to determine the effect of agriculturally based curriculum on student performance on standardized science tests. Such a study could yield more conclusive data on the impact of such an educational innovation.

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INFLUENCES OF AN ELEMENTARY AGRI-SCIENCE PROGRAM ON STUDENT PERCEPTIONS OF AND PERFORMANCE IN AGRICULTURE & SCIENCE

A Critique By:

Robert A. Martin
Professor
Iowa State University

A critical issue in agricultural education is the current focus on adding perspectives on agriculture to the curriculum at the elementary school level. Much has been written regarding literacy and the perceived need to educate people about agriculture. The Agriculture in the Classroom program has been in existence since 1980. We have no real evidence that these efforts have made any impact.

The authors presented a well grounded theoretical framework for the study. A model was presented to help understand the conceptual framework. Making reference to this model near the end of the paper would have been useful in more fully understanding the findings of this study.

The purpose and objectives of the study were clear and the procedures followed in the study appear to be appropriate for this kind of study. There seemed to be an appropriate analysis of the instrument with an acceptable reliability for the instrument.

There seemed to be some confusion about data collection. It was indicated that 5th graders were asked to respond in 1992. Then there was treatment for 3 years. At the end of 3 years data was collected in your words "following the exact same protocol. . .". Does this mean you collected data from these same people who were by then 8th graders or did you collect data from 5th graders again? The tables giving data for 1995 indicates 5th graders. Does this mean data was collected from 2 different groups of 5th graders? The question is "who got the treatment?" Unless this issue is clear what can be said about the data? The "treatment" was never really described. What was the "treatment"? Did these students get the "treatment" as 3rd, 4th & 5th grades? Please explain this statement. . ."Though statistically insignificant, students in control schools tended to possess more positive perceptions about agriculture than that of the control groups." Is there an error in this statement?

The findings indicate that no real change occurred over the three year period. It is not clear as to what change was expected nor who it was expected from because the treatment group is unclear.

The conclusions seem to indicate that the curriculum did not add to or detract from learning in the sciences. What does this say about agricultural awareness efforts? What would you do differently if this study was to be repeated?

So what do we have as a result of this study? What can we use? Where do we go from here? What do these results contribute to the big picture? What are the significant research questions in this area of agricultural literacy?

The study has raised some important questions. The researchers are encouraged to further their study of this topic.

REASONS PRESERVICE TEACHER EDUCATION STUDENTS MAJOR IN AGRICULTURAL EDUCATION

Kirk A. Swortzel
Visiting Assistant Professor
Purdue University

Introduction and Theoretical Framework

As the nation continues the work begun more than a decade ago to redesign its schools for the twenty-first century, the importance of teacher development becomes increasingly clear. The context of teacher education is evolving and changes for its development as a profession can help ensure well-prepared teachers for every child (Darling-Hammond & Cobb, 1996). The mission of education today clearly requires substantially more knowledge and radically different skills for classroom teachers as well as changes in the ways schools operate. If these changes are to take place, major changes must take place in teacher education.

Efforts must be made to recruit, select and retain well-prepared individuals for preservice teacher education programs. Preservice teacher education students must be equipped with the knowledge, skills, and dispositions that will enable teachers to experience success with all students.

The context for preparing future agricultural education teachers has changed in recent years. Agricultural education teachers need stronger backgrounds in science and business to teach these related aspects of agriculture to high school students (Committee on Agricultural Education in Secondary Schools, 1988). Efforts should be made to recruit and select students into preservice teacher education programs in agriculture that have adequate preparation in science and business.

In recent years, only 54% of newly qualified agriculture teacher education graduates have chosen to teach after finishing their degree program (Camp, 1995), leaving 46% to enter other career fields. Why do a large number of preservice teacher education students choose to major in agricultural education and not teach? Furthermore, what attracts those who do not enter teaching to major in agricultural education? These questions are difficult to answer as the literature is void of solutions to the problem.

Why do preservice students choose to major in education? Many researchers in education have identified reasons why preservice teacher education students choose to major in education. The desire to work with children (Yarger, Howey & Joyce, 1977; Wood, 1978; Janzen, 1982; Andrew, 1983; Kemper & Mangieri, 1985; Botempo & Digman, 1985; Book, Freeman & Brousseau, 1985; West & Brousseau, 1987; Marso & Pigge, 1994) was a frequently cited reason by preservice teacher education students for majoring

in education. Other reasons cited for majoring in education included liking the working conditions for teachers (Yarger, Howey & Joyce, 1977; Zimpher, 1988); liking the challenge of being a teacher (Yarger, Howey & Joyce, 1977; RATE, 1987; Zimpher, 1988); being influenced by significant others (Wood, 1978; Roberson, Keith & Page, 1983; RATE, 1987); loving the subject matter they were studying to teach (Andrew, 1983; Kemper & Mangieri, 1985; Botempo & Digman, 1985); enjoying the act of teaching (Botempo & Digman, 1985), like working with people (Joseph & Green, 1986); teaching could lead to other career opportunities (RATE, 1987), and teaching is an honorable profession (RATE, 1987; Zimpher, 1988).

A limited number of studies have been conducted in agricultural education to identify reasons why preservice teacher education students have majored in agricultural education. Cole (1985) found that preservice teacher education students majored in agricultural education because they were influenced by significant others (parents, teachers, and friends). Hillison, Camp and Burke (1987) concluded from their study that preservice teacher education students majored in agricultural education because there were opportunities to get into other careers, there were opportunities to work with young people, they were influenced by their former high school agriculture teacher to major in agricultural education, and they were influenced by their farm background and participation in FFA activities.

As agricultural education has grown to become more diverse in recent years, has the clientele majoring in agricultural education changed as well? If reform is to take place in preservice teacher education, it is helpful to study the components of the preservice teacher education model. Cruickshank (1984) developed a six-component model to help guide inquiry in teacher education. One component was preservice teacher education students, which included looking at the reasons students choose to major in education.

Why do preservice teacher education students choose to major in agricultural education today? Would knowing why preservice teacher education students major in agricultural education influence the recruitment efforts of the profession? Would knowing why students major in agricultural education influence other components of the model, such as the curricula used to prepare prospective teachers? With hardly any existing literature on this problem, it is important that we understand the motives of students waning to major in agricultural education today.

Purpose

The purpose of this study was to examine the preservice teacher education student component of the teacher education model. Furthermore, the study sought to describe the reasons why preservice teacher education students chose to major in agricultural education. Objectives of the study were to:

1) Identify reasons why preservice teacher education students majored in agricultural education

2) Describe how importance each reason was the their decision to major in agricultural education

Methods/Procedures

Population and Sample

The population for this study was preservice teacher education students in the United States who were majoring in agricultural education during the 1995-96 academic year. The actual number of preservice teacher education students majoring in agricultural education during the 1995-96 academic year was unknown. To determine the appropriate sample size for an unknown population size, a formula recommended by Cochran (1963) was used to determine the sample size. Based on Cochran's formula, the number of preservice teacher education students needed for the study was 384.

A cluster sampling procedure was used to select preservice teacher education students for the sample. Cluster sampling is appropriate to use in educational settings when it is difficult to select a random sample of individuals (Fraenkel & Wallen, 1996). Cluster sampling is also easier to implement in schools and is less time-consuming (Fraenkel & Wallen, 1996). Cluster sampling also has its disadvantages; there is a greater chance of selecting a sample that will not be representative of the population.

To select the sample of preservice teacher education students, departments/program areas in the United States offering degree certifications program in agricultural education were randomly selected. The department chair/program coordinator within the department/program area was called to determine if they would assist in collecting data on preservice teacher education students. If the department/program area was willing to help with data collection, the number of available preservice teacher education students to collect data on at that school was determined. This procedure of randomly selecting department/program areas was followed until the desired sample size of 384 preservice teacher education students was selected. Twenty departments/program areas were contacted and agreed to collect data for the study, providing 481 preservice teacher education students.

Instrumentation

Data were collected by way of a three-part mailed questionnaire. Only results from part one of the questionnaire are included in this paper. Part one of the questionnaire contained 37 Likert-type statements for preservice teacher education students to indicate

how important each reason was in their decision to major in agricultural education. The scale of measurement for these statements was as follows: 1 = Unimportant, 2 = Of Little Importance, 3 = Moderately Important, 4 = Important, and 5 = Very Important.

A panel of experts consisting of faculty members and graduate students associated with agricultural teacher education at The Ohio State University reviewed the questionnaire and determined that the questionnaire had content validity. Face validity of the entire questionnaire and reliability on part one of the questionnaire was determined through a pilot test on a group of preservice teacher education students not selected to be in the study. The questionnaire was administered to students enrolled in Agricultural Education 600 at The Ohio State University Winter Quarter 1996 during one week of the quarter. After a week, the questionnaire was again administered to the students. A test-retest reliability coefficient of .76 was calculated on part one of the questionnaire.

Data Collection

To collect data on preservice teacher education students, instructors at institutions offering degree certification programs in agriculture agreeing to collect data on preservice teacher education students were mailed a packet containing the correct number of questionnaires needed for their class(es). Four hundred eighty-one questionnaires were mailed to 20 departments/program areas. Instructors were asked to administer the questionnaire during one class meeting. Instructors then returned the packet of questionnaires to the researcher. A total of 272 usable questionnaires was returned for a response rate of 57%. A number of uncompleted questionnaires never administered to preservice teacher education students were returned to the researcher. Because such a large number of questionnaires were returned, the results of this part of the study can only be generalized to the 272 preservice teacher education students who responded in the study.

Data Analysis

Data were analyzed using the Statistical package for the Social Sciences (SPSS Release 6.1) for Windows. Descriptive statistics, including frequencies, percentages, modes, means and standard deviations were used to organize, summarize, and analyze data. Principal components factor analysis with oblique rotation was used to reduce the number of variables in part one of the questionnaire to a set of common factors identifying reasons why preservice teacher education students major in agricultural education.

Results and Findings

Preservice teacher education students rated 37 statements using the following scale to indicate how important each reason or statement was in their decision to major in agricultural education: 1 = Unimportant, 2 = Of Little Importance, 3 = Moderately

Important, 4 = Important, and 5 = Very Important. Real limits were set as follows: 0 - 1.49 = Unimportant, 1.50 - 2.49 = Of Little Importance, 2.50 - 3.49 = Moderately Important, 3.50 - 4.49 = Important, and 4.5 - 5.0 = Very Important.

Table 1 reports the means and standard deviations for the 37 possible reasons that students might major in agricultural education. Twenty-five of the 37 reasons were rated by students as important in their decision to major in agricultural education. Ten reasons were rated as moderately importance in the decision to major in agricultural education. Only two reasons were of little importance in students' decision to major in agricultural education.

Using principal components factor analysis, the list of possible reasons for majoring in agricultural education was reduced to a set of common factors for majoring in agricultural education. Nine factors produced eigenvalues greater than 1.0. However, based on the scree test, five factors were retained. Variables were assigned to factors based on loadings of .35 (absolute) or greater. Five statements or variables were eliminated since they did not load significantly on any of the five factors.

The possible reasons preservice teacher education students might major in agricultural education that comprised each factor and the loadings for each reason are presented in Table 2. The five factors were labeled by the researcher with the following descriptive terms for discussion purposes: Factor 1 - Mission of Agricultural Education, Factor 2 - External Benefits, Factor 3 - Goal Satisfaction, Factor 4 - Service Orientation, and Factor 5 - Personal Satisfaction.

Table 1
Mean Rankings Indicating Importance of Reasons Why Preservice Students Major in Agricultural Education

I am majoring in agricultural education in the public schools because....	Mean	s.d.
I want to help students gain a sense of self esteem.	4.47	.73
I want to help students gain a sense of personal achievement.	4.44	.76
I think I can be a good agricultural education teacher.	4.39	.73
I like to learn by doing.	4.34	.82
I want to help high school students learn about agriculture.	4.30	.79
I want to apply what I have learned from studying agriculture.	4.28	.84
I want to help students develop a sense of excitement about learning new things.	4.27	.81
I want to help others gain knowledge of things I consider important.	4.21	.75
I have always wanted to study agriculture.	4.19	.96
Faculty members in agricultural education are genuinely interested in students.	4.17	1.98
I enjoy teaching.	4.15	.92
Being an agricultural education teacher would allow me to be creative.	4.14	.94
Being an agricultural education teacher would be challenging.	4.09	.86
Teaching is an honorable profession.	4.02	1.05

(Table 1 continues)

Table 1 (continued)

I am majoring in agricultural education in the public schools because....	Mean	s.d.
Being an agricultural education teacher is a lifelong opportunity to learn.	4.02	.95
I want to work with students in the FFA.	4.01	.84
I am interested in working with high school students.	4.01	.84
I want to gain a sense of personal achievement.	3.99	.84
The agricultural education department/program areas at the university I attend has a good reputation.	3.92	1.20
Teaching would allow me to provide service to society.	3.87	1.01
Teaching is an opportunity to help others less fortunate than myself.	3.87	.97
Teaching can be a way to give back to my community.	3.77	1.06
Being a teacher will allow me to exercise individual initiative.	3.76	.92
I like the working conditions for an agricultural education teacher.	3.72	1.06
Teaching would allow me to have job/financial security.	3.58	1.10
Teaching could lead to another career.	3.47	1.25
I enjoy being associated with schools.	3.45	1.08
I was influenced by a former teacher to major in agricultural education.	3.44	1.50
I like the working hours for agricultural education teachers.	3.16	1.27

(Table 1 continues)

Table 1 (continued)

I am majoring in agricultural education in the public schools because....	Mean	s.d.
Agricultural education teachers receive extra income during the summer months on an extended contract.	3.07	1.32
Being an agricultural education teacher will help me prepare for family life.	3.05	1.23
I was able to be admitted into the teacher education program.	2.97	1.49
Teachers are not required to work holidays.	2.91	1.40
I have always wanted to be an agricultural education teacher.	2.90	1.25
I find the income from teaching to be adequate.	2.89	1.10
I was influenced by a friend(s) to major in agricultural education.	2.42	1.33
I was influenced by family members to major in agricultural education.	2.35	1.37

Table 2
Factor Loadings for the Five Factor Solution on Reasons Preservice eacher Education Students Major in Agricultural Education

Factor Statement	Factor Loading
Factor 1 - Mission of Agricultural Education	
I want to apply what I have learned from studying agriculture.	.67
Teaching is an opportunity to help others less fortunate than myself.	.63
Being an agricultural education teacher would allow me to be creative.	.62
I want to help others gain knowledge of things I consider important.	.62
I like to learn by doing.	.61
I want to help students develop a sense of excitement about learning new things.	.59
I want to gain a sense of personal achievement.	.58
I want to help students gain a sense of self esteem.	.55
Being an agricultural education teacher would be challenging.	.36
Factor 2 - External Benefits	
Teachers are not required to work holidays.	.72
Agricultural education teachers receive extra income during the summer months on an extended contract.	.71
Teaching would allow me to have job/financial security.	.68
I like the working hours for agricultural education teachers.	.61
I find the income from teaching to be adequate.	.55
I like the working conditions for agricultural education teachers.	.47
Factor 3 - Goal Satisfaction	
I have always wanted to be an agricultural education teacher.	.78
I have always wanted to study agriculture.	.71
I want to work with students in the FFA.	.66
I was influenced by a former teacher to major in agricultural education.	.57
Factor 4 - Service Orientation	
Being an agricultural education teacher will help me prepare for family life.	.62
I was influenced by family members to major in agricultural education.	.61
Teaching will allow me to provide service to society.	.56
I was influenced by friends to major in agricultural education.	.54
I was able to be admitted into the teacher education program.	.51
Teaching can be a way to give back to my community.	.47

(Table 2 continues)

Table 2 (continued)

Item Number and Factor Statement	Factor Loading
Factor 5 - Personal Satisfaction	
I enjoy teaching.	-.73
I am interested in working with high school students.	-.70
I want to help students gain a sense of personal achievement.	-.52
I want to help high school students learn about agriculture.	-.50
Teaching is an honorable profession.	-.49
I enjoy being associated with schools.	-.44
Being an agricultural education teacher is a lifelong opportunity to learn.	-.35

Reasons loading on factor 1 dealt with wanting to be a part of the Mission of Agricultural Education. Individual statements loading on this factor dealt with wanting to work with high school students, wanting to teach others less fortunate than themselves, wanting to gain a sense of personal achievement, and liking the challenge of being an agricultural education teacher.

Factor 2, External Benefits, dealt with the benefits agricultural education teachers receive as a part of the job. Not having to work holidays, being financially secure, liking the working conditions and working hours for agricultural education teachers, and having an extended contract were all benefits that were fairly important when considering to major in agricultural education in college.

Reasons loading on factor 3, Goal Satisfaction, dealt specifically why preservice teacher education students wanted to major in agricultural education. Preservice teacher education students have always wanted to be an agricultural education teacher and wanted to work with students in the FFA. These students were also influenced by their former agricultural education teacher to major in agricultural education in college.

Factor 4, Service Orientation, dealt with the family influence and community service activities agricultural education teachers provide. Not only were preservice teacher education students influenced by family members to major in agricultural education, but they thought they could become better prepared for family life and could give something back to their communities.

The final factor, Personal Satisfaction, dealt with the personal reasons for wanting to become an agricultural education teacher. Such reasons included having a lifelong opportunity to learn, wanting to work in school and with high school students, enjoying teaching, wanting to be associated with schools, and having the life long opportunity to learn..

Table 3 presents the means and standard deviations for the five factors. Factor means ranged from a high of 4.12 (standard deviation = .56) on the Mission of Agricultural Education Factor to a low of 3.07 (standard deviation = .84) on the Service Orientation Factor. Using real limits to describe the factors, the factors Mission of Agricultural Education, Personal Satisfaction, and Goal Satisfaction were important in preservice teacher education students' decisions to major in agricultural education while the factors dealing with External Benefits and Service Orientation were moderately important.

Table 3
Rank Order of Means and Standard Deviations of the Five Factor Solution

Factor	Description	Mean	SD
Factor 1	Mission of Agricultural Education	4.12	.56
Factor 5	Personal Satisfaction	4.06	.62
Factor 3	Goal Satisfaction	3.66	.89
Factor 2	External Benefits	3.21	.87
Factor 4	Service Orientation	3.07	.84

Conclusions/Recommendations/Implications

Reasons associated with being involved with promoting the mission of agricultural education, being personally satisfied with decision to be associated with agricultural education, and satisfying a goal to be involved in the agricultural education profession are important when preservice teacher education students make their decision to major in agricultural education. Reasons associated with the external benefits agricultural

education teachers receive through their job and having a social orientation were less important reasons preservice teacher education students considered when making their decision to major in agricultural education.

What are the implications for the agricultural education profession? As the profession continues to recruit students into agricultural education programs, it would appear that efforts should be concentrated on recruiting students who truly wanted to be involved with the mission of agricultural education, who want to satisfy a personal need to become an agricultural education teachers, and whose career goal is to become an agricultural education teacher. How can such attributes be measured? How can the profession truly know that these are the types of students we are recruiting?

Reasons associated with the external benefits received by being an agricultural education teacher and providing service were less important reasons for majoring in agricultural education. Would one not think that these reasons were relatively important in the past? Why would these reasons be rated less important today? With fewer teachers having extended contracts and more teachers coming from non-traditional backgrounds in agriculture or no background in agriculture, these reasons for majoring in agricultural education may become less and less important in the future. Though it cannot be answered from this study, it would be interesting to know how many preservice teacher education students are coming from non-traditional backgrounds and have less previous experience in agricultural education.

Because the results of this study are limited to the responding sample, it is recommended that efforts be made to develop a way to service this data from as many preservice teacher education students as possible to provide a better foundation in agricultural education on why students want to major in agricultural education. Data of this nature should be collected on a periodic basis to identify and analyze trends in why students major in agricultural education.

It is also recommended that research be conducted to determine of certain groups of preservice teacher education students major in agricultural education based upon selected personal and demographic characteristics. Is there a difference in wanting to major in agricultural education based upon high school experiences in agriculture or gender? What about academic performance in high school? Would that influence who might influence who would major in agricultural education? These are just a few challenging questions that need to be addressed if preservice teacher education is a concern of the agricultural education profession.

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REASONS PRESERVICE TEACHER EDUCATION STUDENTS MAJOR IN AGRICULTURAL EDUCATION

A Critique By:

Dr. Lloyd C. Bell
Associate Professor
University of Nebraska-Lincoln

This research addresses the question of why preservice teacher education students chose to major in agricultural education. Further, the research attempted to delineate the importance of the reasons identified.

Initially, one would think the reasons preservice teacher education students chose to major in agricultural education would be well documented, and supported by comparable research reported in the literature of general education. However, as the researcher emphasizes, agricultural education has grown much more diverse in recent years. It seems prudent to revisit the question and assess the reasons why current preservice teacher education clientele are majoring in agricultural education.

Agreement is found with the researcher on the recommendation that this research be replicated in a manner to service data from as many preservice teacher education students as possible. It also seems important that the identification of reasons why students chose to major in agricultural education be done in an authentic manner. The Delphi technique is suggested for consideration. Aithenticity could further be enhanced through the collection of relevant demographic information. One such item might be the point in the students undergraduate career at which they decided to major in agricultural education and pursue teacher education.

A better connection between the theoretical framework of this study, its purpose and objectives, and recommendations would facilitate a greater contribution to the profession. The literature summarizes the importance of relevant preparation, the problem of teacher attrition, reasons why preservice teachers chose agricultural education, and components of a preservice teacher education model. The review seems to confuse the purpose of the study and the related focus for the study's recommendations.

DEMOGRAPHIC PROFILE OF AGRICULTURE TEACHER EDUCATION GRADUATES AND THE RELATIONSHIP OF THEIR CURRENT OCCUPATIONAL STATUS

Kirk A. Swortzel
Visiting Assistant Professor
Purdue University

R. Kirby Barrick
Associate Dean and Director
University of Illinois

Introduction/Theoretical Framework

Educational programs require continual evaluation in an effort to maintain quality in the times of change. This is particularly true today in agricultural education since the context and scope of agricultural education have changed dramatically in recent years. With the recommendations from the Committee on Agricultural Education in Secondary Schools (1988), how agricultural education teachers are prepared in the future will be looked upon with great scrutiny. Agricultural education teachers today must be better prepared in and teach about the science and business of agriculture. Potential agricultural education teachers must be recruited into teacher education programs and provided with a variety of academic and extracurricular experiences that will adequately prepare them as teachers in the future.

Upon completion of a degree certification program, graduates may enter the teaching profession immediately, enter the teaching profession later, never enter the teaching profession, or enter the teaching profession for a brief time and then seek other employment opportunities. Concern regarding the attrition of teachers is growing as studies continue to document statistics on those who choose to leave the profession (Heyns, 1988; Schlechty & Vance, 1981, 1983; Gold, 1996). A small number of studies have addressed the numerous and essential factors associated with teacher retention and have done so mainly in an anecdotal manner. Finding from such studies have been inconsistent and even contradictory in nature.

For approximately 30 years, the agricultural education profession has been concerned about the fact that many graduates of teacher education programs leave the teaching profession shortly after entering the profession. Knight and Bender (1978) reported that over 250 teachers in Ohio left the teaching profession between 1970 and 1975 for reasons other than death or retirement. Birkenholz (1986) found that 14 % of teacher education graduates over a five year period taught and then quit. In Oregon, Cole (1985) found that one-third of teacher education graduates over a 12 year period had taught and left the teaching profession.

Several trends have emerged from teacher attrition studies regarding why teachers leave the teaching profession. Many teachers leaving the profession report that they no longer received the non-monetary awards of teaching that they expected when they first began their careers (Gold, 1996). Research has also shown that some beginning teachers do not teach more than two years and nearly 40 % leave the profession within the first five years of teaching (Harris, 1992, 1993; Heyns, 1988; Schlechty & Vance, 1981, 1983). Furthermore, those who are academically talented are more likely to leave teaching earlier than their counterparts (Heyns, 1988; Schlechty & Vance, 1981, 1983). Rapid changes in teacher working conditions have attributed to their attrition from the profession. Many teachers entered teaching with the belief that they would be allowed considerable career mobility only to discover that they no longer have the mobility they initially believed was available to them (Gold, 1996). Teachers report that they have little if any lateral mobility and even less upward mobility than does individuals in other careers (Farber, 1991).

Teachers of agriculture leave teaching for a variety of reasons. Cole (1985) concluded that teachers of agriculture leave the teaching profession for the following reasons: (a) to spend more time with their families, (b) because the salary was inadequate, (c) there were too many evening responsibilities, (d) they did not like the hours they worked, and (e) too many certification requirements. Knight and Bender (1978) found that teachers left the teaching profession because their long-range occupational goal was something other than teaching, they had students in class that should not have been in vocational agriculture, there were inadequate advancement opportunities, they worked long hours, and the salary was inadequate.

Just as teachers leave the teaching profession, not all graduates enter the teaching profession. Birkenholz (1986) found that just over one-half of graduates over a five year period were currently teaching while over one-third of the graduates never even entered teaching. Reasons for not entering the teaching profession included disliking for the hours worked by teachers, no time for hobbies, no time to spend with family, and inadequate salaries (Cole, 1985).

Teachers of agriculture remain in the teaching profession because of their student teaching experience, agricultural mechanics hands-on skills learned, preparation in curriculum development, and preparation in teaching methods (Cole, 1985). Reilly and Welton (1980) reported that teachers of agriculture remained in the profession because they liked working with rural people, young people, other agricultural education teachers, and they enjoyed the subject matter being taught. Cruickshank (1990) synthesized that teachers remain in the profession because they love to work with children, they want to help those less fortunate, and they can help others gain a sense of personal achievement.

Over the past several years, the state of Ohio has faced a shortage of qualified agricultural education teachers. The turnover rate has been high, new positions have been created, and there have not been enough qualified teachers to fill the positions. The state has certified for over 20 years teachers by alternate means in order to have enough agriculture teachers for the school year. Some teacher shortage problems would be reduced if teachers remained in the profession so not to create additional openings that would have to be filled or either eliminated.

What is causing teacher education graduates to enter and remain, leave, or never enter the teaching profession? What are the characteristics of graduates who remain, leave, or never enter the teaching profession? Generally when we look at graduates who remain, leave, or enter the teaching profession, we look at the reasons why, but never look at the characteristics that may be associated with graduates' occupational aspirations. A knowledge and understanding of these reasons may be beneficial as the profession continues to recruit and retain qualified teachers for the future.

Purposes/Objectives

The purpose of the study was to do a follow-up of students who graduated with a Bachelor of Science in Agriculture degree, with a major in Agricultural Education. Specific objectives of the study were to:

1. ascertain the current occupational status of agricultural education graduates
2. ascertain selected demographic characteristics of graduates
3. identify reasons why graduates enter and remain in the teaching profession
4. identify reasons why graduates leave the teaching profession
5. identify reasons why graduates never enter the teaching profession
6. determine relationships between selected demographic characteristics and current occupational status of agricultural education graduates

Methods and Procedures

Descriptive-survey methods were used for the study. The population for the study included a census of all graduates from the Department of Agricultural Education with a Bachelor of Science Degree in Agriculture, with major in Agricultural Education and seeking teacher certification (N = 233) from Winter Quarter 1985 to Autumn Quarter 1995. Names of teacher education graduates from this time period were obtained from

the administrative secretary in the Department of Agricultural Education. Current addresses of graduates were obtained from the Alumni Coordinator for the College of Food, Agricultural, and Environmental Sciences. All 233 graduates were surveyed in the study.

Data were collected through a mailed questionnaire developed by the researchers. The questionnaire consisted of five parts. Part I asked graduates about their current occupational status. A four point Likert-type scale (1 = Definitely Does Not, 2 = Very Little, 3 = Somewhat, 4 = To a Great Extent) was used by respondents for them to indicate how each reason influenced their decision to enter and remain, enter and leave, or never enter the teaching profession in part II. Part III asked for graduates' perceptions regarding the preservice teacher education program and courses they completed. Teacher certification issues were addressed in part IV. The final section of the questionnaire collected demographic information of graduates. Only data collected from parts one, two and five are reported in this paper.

The questionnaire was checked for content validity by a panel of teacher educators in the Department of Agricultural Education at The Ohio State University. Face validity of the entire questionnaire and reliability by test-retest on part two of the questionnaire were determined through a pilot test on a current group of high school agriculture teachers, teacher educators, extension personnel, and graduate students who were current or former high school agriculture teachers. Reliability on the reasons for remaining in teaching was .647, for the reasons associated with leaving the teaching profession .785, and for the reasons associated with never entering the teaching profession .935.

Data collection procedures as outlined by Dillman (1979) and Salant & Dillman (1995) were utilized in the study. A preletter was mailed to participants informing them of the purpose of the study. An initial mailing and two follow-up mailings, following Dillman's (1979) recommendations were used. A total of 180 of 233 questionnaires were returned for a usable response rate of 77%.

Data were analyzed using the Statistical Package for the Social Sciences (SPSS Release 6.1) for Windows. Data was summarized using descriptive statistics. Frequencies, percentages, means, and standard deviations were used to describe demographic characteristics, current occupational status, and reasons associated with either entering, leaving, or never entering the teaching profession. Cramer's V was used to describe relationships between current occupational status and selected demographic characteristics. One way analysis of variance was used to determine relationships between current occupational status and selected demographic variables. Alpha levels were set at .05 a priori to determine significant differences.

Results

Current Occupational Status

Thirty-eight percent of the teacher education graduates over the past 10 years were currently employed as high school agriculture teachers. Twenty-nine percent intended to teach, but never entered the teaching profession. Twenty-one percent graduated with their degree in agricultural education and never intended on becoming a high school agriculture teacher. Thirteen percent had entered teaching and since left the teaching profession.

Demographic Characteristics

The average agriculture teacher education education graduate was 29 years old. Current teachers of agricultural education were on average of 29 years old. Former teachers of agriculture were 32 years old. Graduates who never entered the teaching profession or never intended to enter the teaching profession were on average 29 years old.

Seventy percent of the graduates who responded were male and 30 percent were female. Sixty-five percent were currently married while 31% were single. The remaining 4% were either separated or divorced at the time of the study.

Ninety-nine percent of the graduates were Caucasian. One percent were of another ethnic race.

Over half of the graduates reported earning additional college credits over their bachelor's degree. Twenty-four percent had only earned a bachelor's degree while 13% had earned their master's degree. Eight percent had earned college credits beyond their master's degree and 2% had earned a doctorate.

Graduates had been employed in their current occupation from 0 years to 11 years with an average of 4 years at their present occupation (standard deviation = 3.00). Regarding their salaries, teacher education graduates earned from $2,500 to $98,750 per year with an average salary of $29,838 (standard deviation = 11,756). Current teachers of agriculture were earning $32,000 per year (standard deviation = 7,570) while graduates who had since left the teaching profession were earning $29,600 (standard deviation = 11,000). Graduates who had never entered teaching or who never intended to enter teaching were earning $28,000 (standard deviation = 13,444), and $28,000 (standard deviation = 15,600) respectively.

While attending college, graduates of the program supported their education through various financial sources. Sixty-one percent received financial support from their parents while 79% worked either full-time or part-time while attending college. Sixty-three percent received scholarships and 34% received grants. One-half received student loans and one-quarter participated in college work study.

Two-thirds of the graduates were members of the Agricultural Education Society while working on their degree with one-quarter of the graduates serving an Agricultural Education Society officer. Seventy-seven percent were former FFA members with two-thirds as former chapter officers and 10% as former state FFA officers. Eighty-three percent were former 4-H club members with 79% serving as a 4-H club officer.

Reasons For Entering and Remaining in the Teaching Profession

Sixty-eight individuals responded there were currently high school agriculture teachers. Respondents indicated to what extent a list of 29 factors influenced their decision to enter and remain in the teaching profession. The five most important factors for entering and remaining in the teaching profession for these 68 respondents were:

(1) "I like teaching agriculture" (Mean = 3.75, standard deviation = .43),
(2) "I like working with high school students" (Mean = 3.71, standard deviation = .46),
(3) "I like working with the FFA" (Mean = 3.68, standard deviation = .53),
(4) "I like the area of the state in which I work" (Mean = 3.49, standard deviation = .79), and
(5) "The community is supportive of agricultural education" (Mean = 3.49, standard deviation = .59).

Reasons for Leaving the Teaching Profession

Twenty-three individuals indicated they had left the teaching profession. Respondents indicated to what extent a list of 34 factors influenced their decision to leave the teaching profession. The top four reasons given for leaving the teaching profession were:

(1) "I had students in class who should have not been there" (Mean = 2.96, standard deviation = 1.03),
(2) "Students lacked interest in studying about agriculture" (Mean = 2.73, standard deviation = 1.08),
(3) "The school administration did not support me" (Mean = 2.55, standard deviation = 1.30), and
(4) "Less emphasis was being placed on agricultural education" (Mean = 2.36, standard deviation = 1.26).

Reasons for Never Entering the Teaching Profession

Fifty-two individuals indicated they never entered the teaching profession. Respondents indicated to what extent a list of 25 factors influenced their decision to never enter the teaching profession. The main reasons given for never entering the teaching profession were:

(1) "I got a better job opportunity in another occupation after graduation" (Mean = 3.04, standard deviation = 1.15),
(2) "I did not find a job in a desired locale" (Mean - 2.49, standard deviation = 1.21), and
(3) "I was not offered a teaching position in agricultural education" (Mean = 2.35, standard deviation = 1.30).

Relationships

Table 1 reports the relationships between selected demographic characteristics and current occupational status of agriculture teacher education graduates. A moderate, significant relationship existed between being a former FFA member and the current occupational status of agriculture teacher education graduates. Graduates who were former FFA members were currently high school agriculture teachers while those who were non-FFA members never intended to teach high school agriculture.

A moderate, significant relationship existed between being a former FFA chapter officer and their current occupational status of agriculture teacher education graduates. Graduates who were former FFA chapter officers were currently employed as high school teachers of agriculture while those who were not FFA chapter officers never intended to teach.

A low, significant relationship existed between the highest degree earned by graduates and their current occupational status of agriculture teacher education graduates. Graduates who earned higher degrees (bachelor's plus, master's, master's plus) were currently employed as a high school agriculture teacher while graduates who only earned a bachelor's degree never intended to teach or else never had the opportunity to enter the teaching profession.

Table 1
Relationships Between Current Occupational Status of Agriculture Teacher Education Graduates and Selected Demographic Characteristics

Characteristics	Cramer's V	p
Gender[1]	.13	.46
Marital Status[2]	.14	.63
Highest Degree Earned[3]	.22	.01
Member of Agricultural Education Society[4]	.16	.19
AGED Society Officer[4]	.19	.09
Former FFA Member[4]	.39	<.01
Chapter FFA Officer[4]	.32	<.01
State FFA Officer[4]	.03	.97
4-H Member[4]	.07	.82
4-H Club Officer[4]	.10	.60

[1] 1 = Female, 2 = Male
[2] 1 = Married, 2 = Single, 3 = Separated, 4 = Divorced
[3] 1 = Bachelor's, 2 = Bachelor's Plus, 3 = Master's, 4 = Master's Plus, 5 = Doctorate
[4] 1 = Yes, 2 = No

One way analysis of variance was used to determine if a relationship existed between the current age of agriculture teacher education graduates and their current occupational status. There was a significant difference between the current age of agriculture teacher education graduates and their current occupational status. Graduates who were former teachers and left the teaching profession were significantly older than graduates who were currently teaching or had never entered the teaching profession. The analysis of the data yielded an F value of 4.59 with a p of <.01 as reported in Table 2. Graduates who had left the teaching profession were 32 years old while graduates who were still teaching or had never entered the teaching profession were 29 years old.

Table 2
Analysis of Variance of Current Age of Agricultural Education Graduates by Their Current Occupational Status

Source	df	SS	MS	F	p
Between Groups	3	217.5604	72.52	4.59	<.01
Within Groups	171	2701.5482	15.80		
Total	174	2919.1086			

One way analysis of variance was used to determine if a relationship existed between the current salaries of agriculture teacher education graduates and their current occupational status. There was no significant difference between the current salaries of agriculture teacher education graduates and their current occupational status. The analysis of the data yielded an F value of 1.20 with a p of .31 as reported in Table 3.

Table 3
Analysis of Variance of Current Salary of Agricultural Education Graduates by Their Current Occupational Status

Source	df	SS	MS	F	p
Between Groups	3	495080792	165026930	1.20	.31
Within Groups	151	20788022455	137669022		
Total	154	21283103247			

Teachers of agriculture enter and remain in the teaching profession for reasons associated with the mission of agricultural education. These teachers like teaching agriculture, like working with high school students, and enjoy working with the FFA. The reason associated with working with young people continues to be an important reason for wanting to remain in teaching, even in previous research studies (Reilly & Welton, 1980; Cruickshank, 1990).

Teacher education graduates leave the teaching profession because of the students they have in their classes while they are a teacher. These students lack the desire to want to study about agriculture and should not be there. Teachers also lack the administrative support they need to stay in their jobs. Having students in class who should not be there continues to remain a problem in the profession with teachers wanting to leave their jobs in teaching (Knight & Bender, 1978).

Teacher education graduates never enter the teaching profession because there are better job opportunities for them other than teaching. These jobs may offer greater salaries than teaching as documented in previous research (Cole, 1985). Furthermore, teachers may to teach only in a desired locale within the state, limiting themselves to opportunities to become employed in the profession, Yet, these reasons are only somewhat influential in their decision to never enter the teaching profession. Additional reasons must be searched out to determine why these individuals seek to graduate from a teacher education programs and become employed in other occupations.

Being a former member of the FFA and serving as a local chapter officer influences the current occupational status of agriculture teacher education graduates. Individuals with such backgrounds are more apt to enter and remain in the teaching profession than those who lack such experiences. Would this mean that recruitment efforts in the agricultural education profession should be concentrated on students who are FFA members and chapter officers? What makes these individuals better apt to enter and remain in the teaching profession over other individuals? Are teacher education graduates who were actively involved in the FFA better able to understand the responsibilities of being in agricultural education teacher?

Considering the results of this study, salary does not influence graduates to enter and leave and teaching profession. Agriculture teacher education graduates who are currently teaching still earn more than those who never entered the teaching profession or those who left the teaching profession. If salary is not influencing individuals to leave the teaching profession, as indicated in previous studies (Cole, 1985; Knight & Bender, 1978), then what is influencing these individuals to quit teaching? Are these individuals unsatisfied with being a teacher? Are these individuals just not cut out to be teachers?

Graduates who only earn a bachelor's degree are more likely not to enter the teaching profession than those teacher education graduates who earn higher degrees. A number of questions could be raised with this conclusion. Are those who just earn bachelor's degrees unable to seek higher degrees because of their undergraduate experiences? Are these individuals unsatisfied with their degree in agricultural education that they seek employment in an occupation that does not promote earning higher degrees? The low relationship between earning higher degrees and remaining in the teaching profession would indicate that one in the profession, agricultural education encourages individuals to continue in their professional development and earn higher degrees.

It is recommended that studies be conducted to further probe the questions addressed above. Results from these studies will help the profession understand the motives for graduates majoring in agricultural education in college and occupational aspirations. It is further recommended that a study be conducted to determine if satisfaction with the degree certification programs teacher education graduates completed had an influence on their current occupational status.

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DEMOGRAPHIC CHACTERISTICS AND CURRENT OCCUPATIONAL STATUS OF AGRICULTURE TEACHER EDUCATION GRADUATES

A Critique By:

Dr. Lloyd C. Bell
Associate Professor
University fo Nebraska-Lincoln

This demographic sudy attempted to identify reasons why agricultural education graduates from The Ohio State University entered and remained, left or never evtered the teaching profession.. It also attempted to determine relationships between selected demographic characteristics and current occupational status of graduates.

The study was well designed and sound research procedures were followed in the collection and treatment of data. An excellent response rate was attained, although no account was given for non-respondent error.

The results of the study are interesting, and for the mose part clear to the reader. Because of large standard deviations, the information on salary averages is difficult to effectively evaluate. A more accurate evaluation might better be facilitated through a reporting of the salary more rather than mean. Based on the responded to statements, the reported means and standard eviations clearly identify reasons why graduates entered and remained in the profession. I am curious, however, as to what respondents may have been thinking when they responded to the words, "I like..." Based on the Likert-type scale utilized (1=definitely does not, 2=very little, 3=somewhat, 4 =to a great extent) and subsequent reported means and standard deviations, the reasons given for leaving or never entering the profession seem much less certain. I encourage the researchers to review their conclusions based upon this data. I I find the non-relationship between State FFA and/or 4-H officer/member as interesting as the relationship between former FFA membership and/or Chapter officer and current occupational status. Although not surprising, I think it is as worthy of comment, and conclusion or statement of implication.

The conclusions bring forth content worthy of deeper reflection and comment. The reasons why teachers enter or remain in the profession are described by the words "like," or "enjoy." What did the respondents mean when they responded to those general descriptors? Did they like working with students, or did they like working with students when placed in the context of agriculture or the FFA? The conclusions that students lack desire and that having students in class who should not be there is a continuing problem seems to respond to a program driven philosophy reather than a student driven philosophy. Schools and their classes are for students, and often the content of the class is secondary to the individual needs of the student.

The researchers are commended for conducting a solid study, and reporting information worthy of reflective thought.

USING EXPERIENTIAL LEARNING TO TEACH EVALUATION SKILLS

Dr. Linda Wulff-Risner
4-H Youth Specialist
Mexico, Missouri

Dr. Bob R. Stewart
Professor
University of Missouri-Columbia

Introduction/Theoretical Base

Experiential education is the process that links education, work, and personal development. As education has become more accessible to all people there has been a corresponding need for educational methods that translate the abstract ideas of academia into the concrete practical realities of people's lives (Kolb, 1984). Kolb proposed that experiential learning theory is a holistic integrative perspective on learning that combines experience, perception, cognition, and behavior.

Experiential education is not a new movement in the field of education. There are numerous scholars who have proposed learning models with the characteristics of experiential learning. John Dewey is considered to be the most influential educational theorist of the twentieth century (Kolb, 1984). As early as 1938, Dewey believed that "there is an intimate and necessary relation between the processes of actual experience and education" (Dewey, 1938, pp 19-20). Dewey believed that textbook problems most often were not real problems to students and that school learning should be an experientially active, not passive affair (cited by Kolb, 1984). Dewey supported learning experiences in which learners are directly in touch with the realities being studied, rather than simply reading about, hearing about, or talking about these realities. When experiential learning techniques are used as contributors to the creation of a learning environment that maximizes learners' skills in learning from their own experience, the full potential for learning can be realized (Kolb & Lewis, 1986).

There has been tremendous growth in the movement towards experiential education in the 1970-1990's. This growth has been validated by numerous reports and national studies which have called for education which more closely links cognitive learning and skills needed for employment (Kraft, 1986). The school-to work transition movement offers real hope for three-fourths of all students, those who will never earn a four-year college degree (Stone, 1994).

Kolb (1984) described three characteristics of experiential learning. First, learning is best conceived as a process whereby concepts are derived from and modified by experience, not in terms of outcomes. Next, learning is a continuous process grounded in experience. Third, the process of learning requires the resolution of conflicts between dialectically opposed modes of adaptation to the world.

Joplin (1981) defined an experiential education activity as one where a real life, work-based experience was followed by an opportunity for a structured reflection on the experience. It is this structured reflection that helps a learner understand the implications of the activity and how it can be applied to more general situations.

Dewey developed his "experiential theory of education" based on the scientific method of inquiry (Adams & Reynolds, 1986). The scientific method of inquiry is the basis of the problem-solving approach to instruction used in secondary agriculture departments in Missouri.

Experiential learning activities can be developed in many situations. One situation in agricultural programs involves the teaching of livestock evaluation or judging skills. Judging implements the experiential learning process and concept of "do, apply, reflect". The student experiences the judging situation, reflects on the information available, processes that information, generalizes concepts previously learned to the situation, and finally makes a decision by applying concepts learned.

Bruner (1966) outlined three major modes of learning: the enactive (direct experience), the iconic (pictorial experience), and symbolic (highly abstract experience). The enactive or direct learning is comparable to the pupil actually judging horses. The iconic can be related to the learning of horse judging through the use of slides, videos, and pictures. Dale's (1969) "Cone of Experience" described a visual analogy to show the progression of learning experiences from direct first-hand participation to pictorial representation to purely abstract, symbolic expression. Gagne (1977) illustrated the levels of complexity in intellectual skills. In order to solve problems the learner must have rules and defined principles that are based on concrete concepts. In order to learn concrete concepts, the learner must be able to discriminate.

The teaching method is a critical aspect of the learning situation. Dale's (1969) Cone of Experience is based on the degree of abstraction in each teaching technique. The degree of abstraction has to do with the amount of immediate sensory participation involved. The more sensory participation involved, the more enjoyable the learning experience (Dale, 1969). In teaching horse judging skills to youth, there would be more sensory participation involved when using live animals; however, high quality video tapes could provide substantial participation on the part of the learner.

Gibbons and Hopkins (1986) contended that there was such a wide range of different programs referred to as experiential that the term lacks meaning. In order to clarify experience based education they created a scale of experientiality. The scale developed by Gibbons and Hopkins translates the aspects of experiential learning into five modes, with each mode representing a major increase in the fullness of experience involved. According to their scale, the experiential learning activities utilized in this study were in the lower two levels of experientiality. The classroom teaching technique utilized a

simulated experience with participants learning from slides, pictures, and videos. The live animal teaching technique involved both a spectator experience and an exploratory experience.

While it is possible to classify experiential education activities using either Dale's Cone of Experience or Gibbons and Hopkins scale of experientiality, it is difficult to verify that experiential education actually has the impact expected. There is little hard evidence about the impact of experiential education programs on participants (Hedin, 1980). Hedin stated:

Little effort has been made to test systematically the assumptions underlying the recommendations or to investigate empirically which specific forms of experiential programs may be the most effective in realizing the hypothesized benefits (p.3).

More recent literature is filled with testimonials, journals, case studies, and other data indicating the positive impact of experiential programs on participants; however, there have been very few experimental or even quasi-experimental research studies that have examined outcomes (Kraft, 1986).

There is considerable evidence in the literature as to the value of experiential education and the use of judging activities to develop the life skills of critical thinking and decision making. There is also evidence as to the efficacy of using audio visual and other simulation techniques in educational situations. However, there appears to be a need to investigate the effectiveness of using classroom teaching techniques such as video tapes, slide sets, and printed matter when teaching horse evaluation skills as opposed to the use of live animal comparisons. This study focused on skills in horse judging acquired by participants involved in two different learning environments. Both learning environments were experiential; however, different teaching techniques were used to present the concepts.

Purpose of the Study

The purpose of the study was to compare two experiential teaching methods on learning outcomes of 8-18 year old students. The learning outcomes evaluated included skills in evaluating and placing conformation and performance classes of horses.

The study was organized to address the following research questions (related null hypotheses were developed):

1. Will participants in the classroom teaching setting achieve the same level of skill in evaluating conformation of horses as the participants who learn using live animals as measured by placing scores achieved in a contest situation?

2. Will participants in the classroom teaching setting achieve the same level of skill in evaluating performance classes of horses as the participants who learn using live animals as measured by the placing of scores achieved in a contest situation?

Methods/Procedures Used

A quasi-experimental design was selected for this study. Cook and Campbell (1979) described quasi-experimental in the following manner.

> Quasi-experiments are experiments that have treatments, outcome measures, and experimental units, but do not use random assignment to create the comparisons from which treatment caused change is inferred. Instead, the comparisons depend on non-equivalent groups that differ from each other in many ways other than the presence of a treatment whose effects are being tested. The task confronting persons who try to interpret the results from quasi-experiments is basically one of separating the effects of the treatment from those due to the initial non-comparability between the average units in each treatment group; only the effects of treatment are of research interest. (p.6)

The population for this study was secondary agriculture and/or 4-H students aged 8-18 from Central Missouri who were involved in the study of judging horses. The participants of the study formed a purposive sample. A purposive sample is characterized by the use of judgment and a deliberate effort to obtain representative samples by including presumably typical areas or groups in the sample (Kerlinger, 1973, p. 129). The participants included 98 students aged 8-18 who participated in a workshop on horse judging in February, 1994.

The experimental treatment involved the use of two different experiential teaching techniques to teach established concepts. The lesson plan for both workshop teaching techniques contained the same concepts and the same length of time spent on each topic. The lesson plan included concepts on judging conformation and performance classes and preparation and presentation of oral reasons. The first treatment group learned through the use of live animals and viewed demonstrations of the concepts presented using live animal comparisons. The second treatment group received classroom instruction through the use of charts, photographs, video tapes, and slides.

The quasi-experimental study used a repeated measure on one factor (time). The independent variable was teaching technique. There were two dependent variables: conformation scores and performance scores. The repeated measures were the pre-test scores on conformation and on performance.

Outcome measures were assessed using the placing scores of participants in a contest situation. The contest was run according to National Horse Judging Team Coaches Association guidelines (1990, pps. 11-24). The placing scores were tabulated on a scale of 1-50, with 50 being a placing that matched the official judge exactly. "Cuts" were assigned by the official judge. Cuts were deducted for a placing different than the official and were based on the severity of the discrepancy as outlined in the Official Handbook of the National Horse Judges Team Coaches Association (1990, pps. 18-19).

An analysis of variance procedure was used to test the hypotheses with the alpha level set at .05. The general linear model procedure was used to adjust for unequal cell size.

Findings

Data for the study were collected under contest conditions at two workshops on horse judging. The students ranged in age from 8 to 18 years of age. As shown in Table 1, the majority of participants in both groups were ages 12-18.

Table 1
Number of Participants by Age and Group

	Conformation	Performance
Classroom		
8-11 year olds	17	6
12-18 year olds	34	25
Live animal		
8-11 year olds	19	9
12-18 year olds	28	25

The first null hypothesis was developed to determine if there was a significant difference in the pre-test and post-test scores of participants between two teaching techniques: classroom and live animals on the skills associated with judging conformation classes.

The hypothesis was stated as follows:

HO: There is no significant difference between pre-test and post-test scores of participants who learned using classroom teaching techniques and scores of participants who learned using live animal teaching techniques on the variable conformation score.

The ANOVA procedure, as reported in Table 2, produced a F value of 6.56 (p>.01) which was significant. Therefore, the hypothesis was rejected. There was a significant difference in the post-test minus pre-test score for conformation between the groups. Examination of least square means in Table 3 shows that the amount of change in score of participants in the classroom teaching group were significantly higher than for participants in the live animal teaching group (14.20 vs 8.41).

Table 2
ANOVAs for Conformation and Performance Scores

Variable	df	ss	ms	f	p>f
Confirmation					
	1	760.25	760.24	6.56	.01
Teaching technique	97	11648.99	867.45		
Error					
Performance	1	122.58	122.58	1.10	.30
Teaching technique	63	6719.02	130.71		
Error					

Table 3
Least Square Means Pre-Post-Test Scores by Teaching Techniques for Conformation and Performance

Variable	Least Sq. Mean	Std. Error
Confirmation		
Classroom	14.20	1.61
Live animals	8.41	1.59
Performance		
Classroom	2.24	2.05
Live animals	-1.08	2.41

Null hypothesis HO_2 was stated as follows:

HO_2: There is no significant difference between pre-test and post-test scores of participants who learned using classroom teaching techniques and scores of participants who learned using live animal teaching techniques on the variable performance score.

This hypothesis was tested using ANOVA with the alpha level set at .05. The ANOVA as reported in Table 1, produced a F value of 1.10 ($p > .30$). The null hypothesis was not rejected. There was not a significant difference between teaching techniques on the dependent variable of performance score. The least square means are reported in table 2.

Conclusions/Implications

Based on the findings of this study, contingent upon limitations and assumptions, the following conclusions were made.

1. Students can learn conformation judging skills equally well, if not better, through the use of audio-visual aids including video tapes and slides as opposed to the use of live animals.

2. Students can learn performance judging skills equally well from the use of audio-visual aids including video tapes and slides as opposed to the use of live animals.

Students in the classroom teaching group learned more about judging conformation than students in the live animal teaching group. This could be explained by the nature of the subject. Selection criteria for judging conformation is very specific, the criteria are prioritized and the criteria are concrete, therefore the structure offered by the classroom teaching could benefit learning. During live animal evaluation there are many more distractions which divert the judges attention from evaluating and prioritizing specific criteria. By using audio-visual aids the instructor can illustrate desired principles without distractions.

Horse judging skills can be successfully taught using audio visual aids such as video tapes and slides. The horse judging team coach can use audio visual aids to teach judging concepts without transporting the students and making arrangements for horses to practice on. This can save significant time and money. While students can effectively learn judging skills through the use of audio visual techniques, there could be a lowered motivation to learn if this was the only teaching technique used.

A related analysis confirmed that older students had higher scores than did the younger students. However, there was not a significant interaction found between age and teaching technique. This was an expected outcome as the level of instruction was geared to the older participants.

The skills associated with teaching evaluation of performance events are more difficult to teach than are those related to conformation. The criteria tend to be more ambiguous with less clear cut priorities about what is important. In addition four animals are involved and the judge and the participants may not view the same behaviors during the course of the class. Therefore, the criteria may be applied in different ways. This explains, in part, the finding of no significant difference in the conformation scores after the workshop experience.

Overall, the findings of this study suggest that the efficacy of audio visual techniques in teaching horse judging skills should warrant the development of more and better videos and slides which can be used in teaching judging skills. Development of these teaching materials could be more cost effective than transporting students to judge live horses.

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USING EXPERIENTIAL LEARNING TO TEACH EVALUATION SKILLS

A Critique By:

Larry E. Miller
Professor
Ohio State University

A clear theoretical framework is presented in the paper with reference to experiential learning. Research questions are clearly specified.

Sample studied was purposive which limited the external validity of the study.

The independent variable, method of teaching, had 2 levels both of which purported to be experiential in nature. Therefore, I would cite from Kerlinger the MAX portion of the MAXMINCON Principle: Maximize the systematic variance in the variable of interest. I would argue that this was not done. The 2 methods were not different enough from each other at the outset to be hypothesized to produce a difference. Thus, I would have posited, before the study was even conducted, that one would accept the null hypotheses in all cases.

The dependent variables were not conformation scores and performance scores but GAIN SCORES, which numerous authors warn against utilizing. A far preferable analysis method to the use of ANOVA would have been ANCOVA using the pretest as the covariate. To compensate some for the analysis method that was used, a test of significance differences on the pretest scores would have been warranted.

The researchers do not report how the purposive selected (self-selected, I presume) subjects were assigned to level of the independent variable. Since no mention was made of randomization, I will assume there was none and again say that a test for pretest difference would have been warranted.

Regarding a matter of style of research reporting, relating the findings back to the theoretical basis would have been a good addition to the paper.

THE INTERACTION EFFECT OF TEACHING APPROACH AND LEARNING STYLE ON STUDENT ACHIEVEMENT AND SATISFACTION IN A SENIOR LEVEL ANIMAL SCIENCE COURSE

Greg Miller
Assistant Professor

Mark Honeyman
Assistant Professor

Iowa State University

Introduction /Theoretical Framework

Learning styles is an area of inquiry that has received much attention of late from researchers in agricultural education. Learning style may be defined as "the characteristic cognitive, affective, and psychological behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment" (DeBello, 1990, p. 203). Agricultural education researchers have generally focused on the field-dependence / independence psychological dimension that concerns a learner's perception of the learning environment (Miller, 1995). This line of inquiry has given clues to how agriculture students learn. Garton (1993) provided a thorough literature review on field-dependent and field-independent learner preferences. This review emphasized the extremes of the continuum of learning styles. Learners of either learning style preference will not necessarily exhibit all characteristics and behaviors associated with their style, however. Table 1 summarizes the characteristics and behaviors associated with the field-dependent and field-independent learning styles.

Several studies (Cano, Garton, & Raven, 1992; Cano & Metzger, 1995; Miller, 1995; Raven, Cano, Garton, & Shelhamer, 1993; Torres & Cano, 1994; Whittington & Raven, 1995) have been conducted with the primary aim of describing the learning styles of a particular population of agricultural learners. Most of these studies imply that knowledge of learning styles may be used by teachers to improve instruction. Exactly how this information should be used has not been made clear.

Literature cited by Doebler and Eicke (1979) suggests that matching students and teachers who share the same cognitive style may be wise. Agricultural educators seem to favor sensitizing instructors to learning styles information with the idea that instructors would be more apt to adapt instruction to student learning styles. In either case, the implication seems to be that instruction that is in harmony with an individual's learning style will improve the student's performance, shorten study time, and improve the student's attitude toward learning (Chinien & Boutin, 1993). Yet, empirical evidence in favor of matching instruction to cognitive style is lacking (McKenna, 1990; Mayer, 1987).

Students can be categorized as to their learning styles, and several generalizations about their approach to learning can be made. However, can agricultural educators use this

information in practical ways? Based on an understanding of student learning styles, can agricultural educators design instructional methods that make a positive difference in the achievement and satisfaction of students? Torres and Cano (1994, p. 65) wrote that "research should be conducted to determine if students taught in their preferred learning style score higher on tests, assignments, and attitude than those taught in a manner dissonant from their orientation."

Table 1
Characteristics and Behaviors Associated with the Field-Dependent and Field-Independent Learning Styles

Learning Style	
Field-Dependent	Field-Independent
◆Find it difficult to learn when the learning task involves several steps.	◆Able to accomplish learning tasks
◆Experience difficulty in problem-solving situations.	◆Good as analytical problem-solving
◆Prefer to have answers provided by the instructor.	◆Prefer an inquiry approach to learning.
◆Prefer externally defined goals and organization.	◆Can provide their own structure for learning activities.
◆Prefer a spectator approach to learning.	◆Prefer trial and error as opposed to being shown how.
◆Value positive reinforcement from the teacher.	◆Do not typically respond to positive reinforcement offered by teachers.
◆Have well-developed social skills and are more attuned to social cues.	◆Have poorly developed social skills and are more socially independent.
◆Favor extrinsic motivation.	◆Are intrinsically motivated.
◆Prefer collaboration.	◆Prefer competition

Purpose and Objectives

The purpose of this quasi-experimental study was to determine if instruction designed to match a student's preferred learning style would result in higher levels of student achievement and satisfaction. The research hypotheses were as follows:

1. There will be no significant three-way interaction between teaching approach, laboratory section, and learning style regarding student achievement and satisfaction.

2. The effect of teaching approach will not significantly interact with laboratory section regarding student achievement and satisfaction.

3. Students will attain higher levels of achievement and satisfaction when taught with methods that support their preferred learning style.

4. Overall, students will attain higher levels of achievement and satisfaction when taught with a combination of methods preferred by both field-dependent and field-independent learners.

Procedures

The sample consisted of 42 students enrolled in a senior-level university class in swine management during the fall semester of 1995. This three-credit course consisted of two 50-minute lectures and one 110-minute laboratory session each week. Students enrolled in the course were divided into three laboratory sections during registration. The three laboratory sections met on Wednesdays at 10:00 a.m., noon, and 2:00 p.m.

A counterbalanced design (Campbell & Stanley, 1963) was used to test the research hypotheses. The researchers used three different teaching approaches (field-dependent, field-independent, and combination) with each of the three laboratory sections. The order of treatment was determined randomly for the first week; for the remaining weeks, the treatments were ordered to balance the design. This was done to ensure that the treatment effects would be demonstrated across laboratory sections and subject matter. After each experimental laboratory, an achievement test and a lesson satisfaction instrument were completed by all students.

Teaching approach was the active independent variable in this study. For each of the three laboratories involved in the study, the instructor and the researcher worked collaboratively in designing three distinct lesson plans. One lesson plan emphasized teaching methods that should appeal to field-dependent learners, another was designed to appeal to field-independent learners, and the third was a combination of the former two approaches. The instructor focused on three primary areas of difference between field-

dependent and field-independent learners in developing the instructional approach. The three focal areas included motivation of the learner, social aspects of learning, and a spectator vs. inquiry approach to learning. Sessions taught with a field-dependent emphasis included learning activities such as student role playing, consensus building, and team reports of readings. Field-independent activities included individual student competitions, individual reporting, and individual defense of opinions. When emphasizing the field-dependent approach, the instructor provided recurring positive feedback to students, led discussions, and highlighted information. The field-independent approach was emphasized by reducing positive feedback, allowing students to work on their own as much as possible, using voting to decide issues, and limiting comments to answering student questions.

An important nonmanipulated independent variable in this study was learning style. Learners were categorized as either field-dependent or field-independent by using their score on the Group Embedded Figures Test (GEFT)(Witkin, Oltman, Raskin, & Karp, 1971). The GEFT is a standardized instrument with a reliability estimate of .82. Also, concurrent validity with the Embedded Figures test was .82 for males and .63 for females. The GEFT was administered after all achievement and satisfaction data had been collected and entered into the computer. Therefore, the instructor was not informed of student learning styles until after the experiment was complete. A median split was used to place students into learning style groups (Spanier & Tate, 1988; Thompson & Knox, 1987). Students who scored below the group median of 12.5 were labeled field-dependent, and those with scores greater than the median were labeled field-independent.

The dependent variable achievement was measured with instructor-made tests. For each experimental laboratory, a measure of achievement was developed. The tests were content valid in that each was designed to measure student learning of important concepts taught during a particular laboratory. Students were not told that they were participating in an experiment, and the scores for these measures of achievement were counted as part of the students' grade. All test scores were reported as a percentage of items correctly answered.

The learner satisfaction measure was developed by the researchers. Students enrolled in a senior level agricultural education course were asked to think about teaching methods that suited their style of learning and then write statements that would represent a positive perspective on this instruction. These statements were used as a basis for constructing the instrument that consisted of 13 Likert-type items with response categories ranging from strongly disagree (1) to strongly agree (5). Agricultural faculty and staff determined that the instrument possessed content and face validity. The learner satisfaction instrument had a Cronbach's alpha reliability coefficient of .86.

All data were analyzed with the SPSS/PC+ personal computer program. Means and standard deviations were used to describe achievement and satisfaction levels of the teaching approach by learning style groups. Repeated measures factorial analysis of variance was used to test the treatment and interaction effects. The alpha level was set at .05 for determining statistical significance.

Results

Results are reported by teaching approach, learning style, and laboratory section for achievement (Table 2) and satisfaction (Table 3). Results indicate that the effect of the teaching approach by laboratory section by learning style interaction was not statistically significant relative to student achievement (Table 4) or satisfaction (Table 5).

This result supports the first research hypothesis. The two-way interaction involving teaching approach and laboratory section was statistically significant for achievement (Table 4) and satisfaction (Table 5). Therefore, the second research hypothesis was not supported. The interaction effects for achievement (Figure 1) and satisfaction (Figure 2) are displayed graphically. For achievement, this interaction is consistent with the interaction between teaching approach and learning style (Figure 3). In section one, more than twice as many learners tended toward a field-dependent learning style rather than toward a field-independent style. In section three, however, the distribution was seven to one in favor of field-independent learners. Also, the lowest achievement scores for each section were obtained with the teaching approach that they experienced first. Figure 2 demonstrates that student satisfaction with a particular teaching approach depended on the section in which they were enrolled. However, this interaction is also consistent with the interaction between teaching approach and learning style (Figure 4) when the learning style distributions of sections are considered.

The two-way interaction between teaching approach and learning style was not statistically significant for achievement (Table 4) or satisfaction (Table 5). This finding does not support the third research hypothesis. The interactions for achievement (Figure 3) and satisfaction (Figure 4) are presented graphically. While the interaction for achievement is not statistically significant, the results are of practical significance. Figure 3 shows that students attained higher achievement scores when taught with methods designed to satisfy the preferences of the opposite style. Figure 3 further shows that field-independent learners attained a 6% advantage in achievement when taught with the field-dependent teaching approach as opposed to the field-independent approach. Field-dependent learners attained higher achievement scores when taught with the combination approach. For field-dependent learners, the advantage of the combination approach was 21.9% over the field-dependent teaching approach and 13.8% over the field-independent teaching approach.

Overall, field-dependent and field-independent learners were satisfied with all three instructional approaches. On a five-point scale, both groups of learners provided mean satisfaction scores above 3.50 for all three teaching approaches. Figure 4 shows that field-independent learners were most satisfied with the combination teaching approach and were equally satisfied with the field-dependent and field-independent teaching approach. However, the field-dependent learners were most satisfied with the field-dependent teaching approach followed by the combination approach and the field-independent approach.

Overall, the combination teaching approach resulted in achievement scores that were 8.68% higher than the field-independent approach and 9.73% higher than the field-dependent approach. Differences of this magnitude are of practical significance. This main effect should be considered in light of the interaction effects, however. The combination approach was effective for both learning style groups, but field-dependent learners realized the greatest benefit from this instructional approach.

There was a statistically significant main effect for teaching approach on achievement (Table 4). The main effect of teaching approach on satisfaction was not statistically significant (Table 5) nor was it of practical significance.

Table 2
Descriptive Data for Learner Achievement by Teaching Approach, Learning Style, and Section

	Teaching Approach											
	Field-Dependent			Field-Independent			Combination			Overall		
Learning Style	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n
Field-Dependent	68.69	20.85	21	76.79	17.20	21	90.59	7.22	21	78.69	6.94	21
Section 1	58.80	15.54	15	83.17	7.82	15	89.75	6.95	15	77.24	5.82	15
Section 2	94.00	6.52	5	58.00	25.88	5	95.24	5.83	5	82.41	9.71	5
Section 3	90.48	.00	1	75.00	.00	1	80.00	.00	1	81.83	.00	1
Field-Independent	84.24	14.06	21	78.22	14.91	21	81.81	22.39	21	81.42	7.25	21
Section 1	68.86	14.46	7	86.39	6.97	7	94.46	3.22	7	83.24	6.31	7
Section 2	93.38	5.53	7	64.29	18.13	7	95.24	2.75	7	84.30	6.82	7
Section 3	90.48	.00	7	83.98	4.51	7	55.71	21.49	7	76.72	7.04	7
All Learners	76.46	19.25	42	77.51	15.91	42	86.19	17.02	42	80.06	7.14	42
Section 1	62.00	15.61	22	84.20	7.55	42	91.25	6.34	22	79.15	6.49	22
Section 2	93.64	5.68	12	61.67	20.82	12	95.24	4.06	12	83.51	7.79	12
Section 3	90.48	.00	8	82.86	5.25	8	58.75	21.67	8	77.36	6.76	8

Table 3
Descriptive Data for Learner Satisfaction by Teaching Approach, Learning Style, and Section

	Teaching Approach											
	Field-Dependent			Field-Independent			Combination			Overall		
Learning Style	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n
Field-Dependent	4.08	.35	21	3.61	.68	21	3.75	.54	21	3.81	.44	21
Section 1	4.04	.38	15	3.42	.71	15	3.67	.59	15	3.71	.45	15
Section 2	4.15	.29	5	4.00	.22	5	3.92	.38	5	4.03	.29	5
Section 3	4.31	.00	1	4.46	.00	1	4.12	.00	1	4.30	.00	1
Field-Independent	3.79	.43	21	3.77	.56	21	3.96	.36	21	3.84	.33	21
Section 1	3.82	.28	7	3.21	.52	7	3.85	.33	7	3.63	.21	7
Section 2	3.91	.48	7	4.08	.15	7	3.91	.15	7	3.97	.19	7
Section 3	3.65	.53	7	4.01	.47	7	4.12	.51	7	3.93	.44	7
All Learners	3.94	.42	42	3.69	.62	42	3.86	.47	42	3.83	.38	42
Section 1	3.97	.36	22	3.36	.65	22	3.73	.52	22	3.68	.39	22
Section 2	4.01	.41	12	4.04	.18	12	3.92	.26	12	4.00	.23	12
Section 3	3.73	.54	8	4.07	.46	8	4.12	.47	8	3.97	.43	8

Note: Based on scale: 1 = strongly disagree; 2 = disagree; 3 = undecided; 4 = agree; 5 = strongly agree.

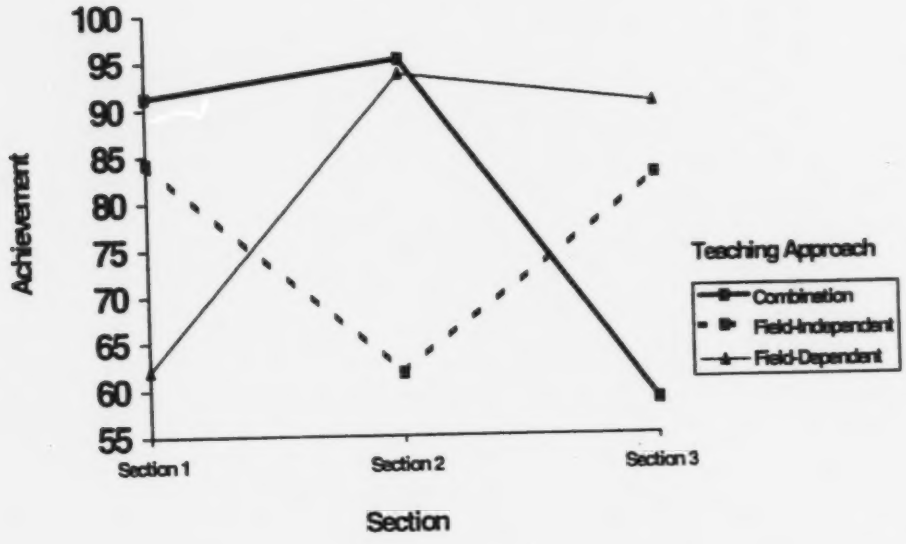

Figure 1. Interaction of teaching approach and laboratory section.

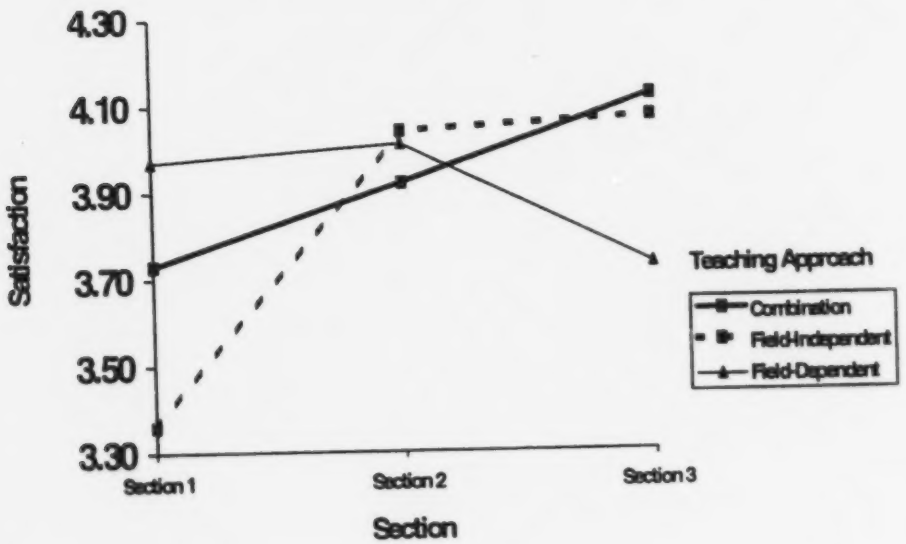

Figure 2. Interaction of teaching approach and laboratory section.

Table 4
Multivariate Tests of Significance for Within Subjects Effects on Achievement

Effect	Pillais	F	Sig. of F
Teaching Approach	.19	4.10	.03
Teaching Approach X Learning Style	.10	1.97	.15
Teaching Approach X Section	1.04	19.44	.00
Teaching Approach X Learning Style X Section	.12	1.13	.35

Table 5
Multivariate Tests of Significance for Within Subjects Effects on Satisfaction

Effect	Pillais	F	Sig. of F
Teaching Approach	.03	.50	.61
Teaching Approach X Learning Style	.10	2.01	.15
Teaching Approach X Section	.35	3.85	.01
Teaching Approach X Learning Style X Section	.07	.63	.65

Conclusions / Recommendations / Implications

In this study there was a significant interaction between laboratory section and teaching approach for achievement. This interaction may be attributable to the learning styles composition of the sections. However, it may also be plausible to conclude that the interaction resulted from a need of the instructor to become comfortable with three different teaching approaches. Another possibility could be the nature of the content for the first week of the experiment. In future studies, each group should experience all treatments on two or more occasions. This would allow potential extraneous effects like content and laboratory section to be averaged out. These extraneous variables must be controlled for the interaction of teaching approach and learning style to be reliably interpreted.

The teaching approach used by the instructor made little difference to field-independent learners but mattered significantly to their field-dependent counterparts. Students were more satisfied with instruction designed to meet their learning style preferences but attained higher levels of achievement when the teaching approach did not match their learning style preference. This implies that matching teaching methods to learning styles may result in more satisfied learners. Yet the challenge of being confronted with teaching methods dissonant to a learner's preference may result in greater cognitive effort and gains in achievement.

A combination of teaching methods suited to field-dependent and field-independent learners was most effective for students involved in this study. This suggests that individualized instruction based on students' learning style preferences is not necessary and will not yield the positive achievement results suggested in the learning styles literature. A more practical and effective approach is for instructors to select a combination of teaching methods suited to both styles on a consistent basis. Using a variety of teaching methods is one of five promising teaching behaviors for influencing student achievement (Rosenshine & Furst, 1971).

This study should be replicated across agricultural disciplines at the university level to determine if the results have broader applicability. This type of research is needed in high school agriculture programs. Additional learning style applications research could be the basis for effective practical teaching approaches for agricultural educators.

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THE INTERACTION EFFECT OF TEACHING APPROACH AND LEARNING STYLE ON STUDENT ACHIEVEMENT AND SATISFACTION IN A SENIOR LEVEL ANIMAL SCIENCE COURSE

A Critique By:

Larry E. Miller
Professor
Ohio State University

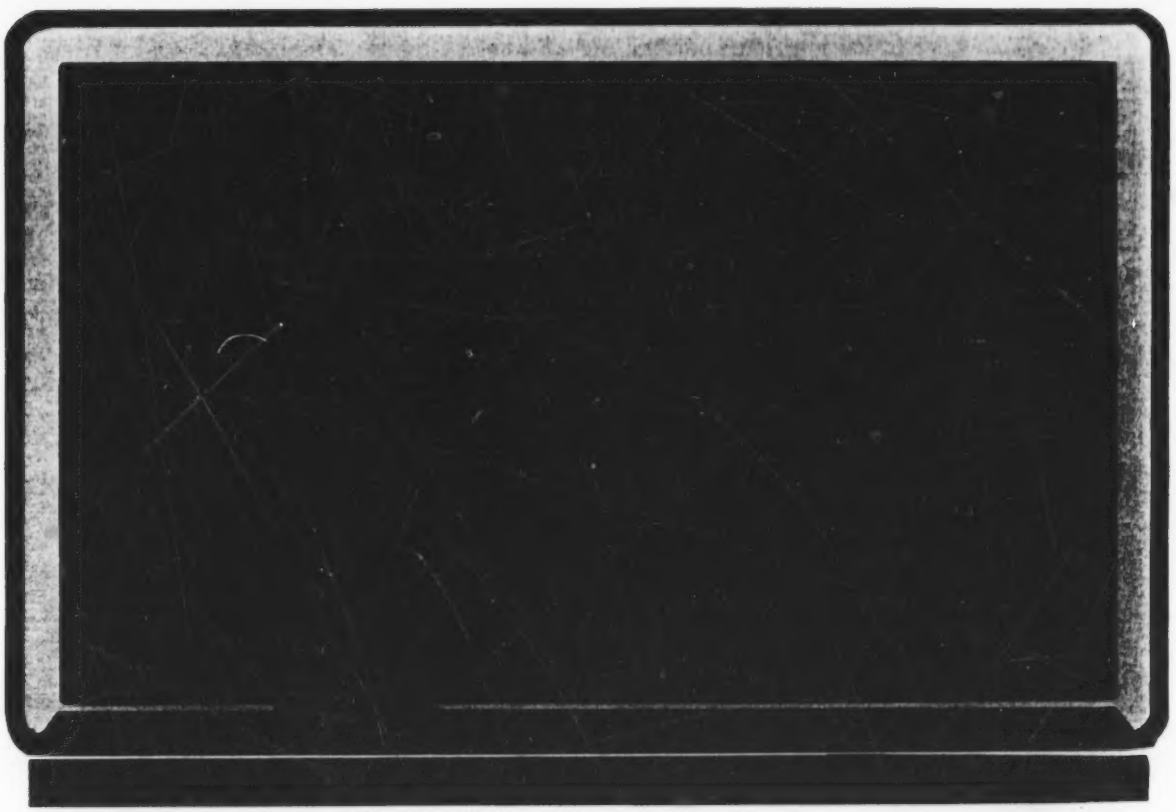
This study was unique in that it reports on the conduct of an experimental study with students in a higher education setting. The paper presents a clear, concise and intuitive theoretical framework for the study. The paper presents very clear and specific research hypotheses to be tested.

As best I can determine, the procedures of the study were very appropriate with even the interactions plotted in the paper for increased understanding.

My only suggestion for improvement would be to tie the conclusions back to the theoretical framework to permit one to see how the study had contributed to knowledge in the field.

I particularly like seeing a researcher from a technical field of agriculture collaborating with a researcher from agricultural education. This paper should be applauded for its uniqueness, sound theoretical basis, thorough and careful analysis and the fact that it can serve as a beacon to suggest future collaborative efforts in higher education of an interdisciplinary nature.

Proceedings of the AAAE Central Region Poster Session



ENHANCING PROFESSIONAL DEVELOPMENT FOR AGRICULTURAL EDUCATION STUDENTS

Jason D. Haak
Kirk A. Swortzel
Jerry L. Peters
B. Allen Talbert
Purdue University

Introduction

More agricultural education students in college are coming from non-agricultural education high school backgrounds. Furthermore, agricultural education programs increasingly have students with different career objectives, who are dual majors, who are seeking masters degree certification, etc. Faculty and students have less time to participate in night and weekend activities that would aid in their professional development. There was a need to bring all students together to provide instruction and practice in professional skills, knowledge, and attitudes that all agricultural education graduates need in order to succeed in their careers.

Methodology

A seminar-type course, EDCI 240 - Seminar in Agricultural Education, was developed to address the above issues. The course is offered each semester during the academic year and students are able to take the course each semester that it fits their schedule. It meets for a 75 minute period on Thursdays each week. Students receive one hour of credit and are graded on an A-F scale. Points are awarded through participation in professional, leadership, community service, educational, and social activities. Students submit activity reports and course assignments via e-mail. One staff member is assigned to coordinate the course, but all agricultural education faculty, staff, and graduate students participate.

Course content is rotated each week among committee meetings, seminars, and IVATA-Purdue (the agricultural education student organization) chapter meetings. Each student enrolled is a member of one of four standing committees: Campus and Community; Program and Career Development Events; Awards, Membership, and Finance; and Publicity. Each committee selects a committee chair for that semester. A Program of Activities is developed each spring for the following year and committees use this as their guide. Committees are responsible for coordinating one seminar each semester. The chapter meeting is chaired by the IVATA-Purdue president and is run by the class members.

Results

A typical semester has 75% or more of the agricultural education students enrolled. The course receives high marks on the University standardized course evaluation form. More students are participating in activities than were before the course was started. Students have commented that by participating in this course they:

- receive current, practical information from people in the field,
- earn academic credit for participating in professional development activities,
- learn how to use electronic communications and develop an appreciation for its usefulness,
- associate with all or most agricultural education students from freshmen through graduate students, and
- have regular contact with faculty and staff.

Future Plans

Students have reported that although it is good to learn to use e-mail and that it is easy to use once learned, the University computing system can be cumbersome at times. They report that servers go down, computer labs seem to be always full, and modem lines into the University system are typically busy until well after midnight. Consideration needs to be given to finding alternative methods of teaching students how to use e-mail, providing easier access to the technology, or reducing the number of assignments required using e-mail. There are still students who do not fully participate in all opportunities available to them. We are undecided as to how to get them to take advantage of learning experiences that will help them be better prepared for their eventual careers.

Costs

The course costs approximately $1.00 per student for copying of handouts, etc. Because the course is taught over the lunch hour, there have been semesters that once per month IVATA-Purdue provides lunch which costs $1.00 per student. At the present time, faculty are teaching the course as an overload in addition to their required teaching load.

RURAL CITIZEN PERSPECTIVES ON MICHIGAN GROUNDWATER: FINDINGS FROM FOCUS GROUP INTERVIEWS

David Krueger Rachael Post Murari Suvedi
Center for Evaluative Studies
Michigan State University

Introduction

The Michigan Groundwater Stewardship Program was established in 1994 with the passage of PAA 247 GWFWPA. This Program is administered by the Michigan Department of Agriculture (MDA). It has developed and adapted a program structure to protect Michigan's groundwater and freshwater in coordination with federal agencies including Natural Resources Conservation Service, Farm Service Agency, state agencies such as Michigan Department of Environmental Quality, Michigan State University Extension, and professional and industrial organizations. This program focuses on research, education and service. It promotes farmers protection of groundwater from pesticides and fertilizer contamination. The mission of the Michigan Groundwater Stewardship Program is to provide information and assessment tools to pesticide and fertilizer users to assist them in identifying groundwater risks associated with their land-use practices; and to coordinate private, local, state, and federal resources to reduce those risks. The long-range plan recognizes the need for shifting the programs' efforts toward more direct service to the needs of the public. The program has formulated an integrated approach for demonstration, education, and service which emphasize its primary role as promoter and implementer of safe farming practices.

Program evaluation is an important component of the Michigan Groundwater Stewardship Program. In order to document the program's impact, the AEE Center for Evaluative Studies proposed formative and summative evaluation of the Michigan Groundwater Stewardship Program activities. Specific evaluation data including a series of mail and telephone surveys, focus group interviews, pre and post assessment, and personal interviews were conducted as part of the formative evaluation process. This specific paper documents the findings of focus group interviews on rural citizens perspectives of Michigan Groundwater and was prepared to offer the Michigan Groundwater Stewardship Program insights and perceptions about groundwater issues throughout the state.

The focus groups were conducted in Escanaba, Grand Rapids, Jackson, Kalamazoo, Saginaw, and Traverse City. Participants included farmers, agribusiness representatives, Extension specialists, and others who represent a cross section of our rural community. These individuals were asked to respond to eleven questions designed to elicit opinion on issues important to the Michigan Groundwater Stewardship Program and further evaluation efforts.

Objectives

1. To explain how focus group interviews are used to study citizens perspectives on groundwater stewardship issues.

2. To share how focus group study findings are used in designing educational and cost-share programs for the Michigan Groundwater Stewardship Program.

Methods

A series of focus groups were conducted in six cities around Michigan. Each city was chosen for the geographic conditions of the surrounding area. Once the cities were chosen, the local Extension and Farm Bureau offices were contacted to obtain a list of the local farmers, agribusiness representatives, Extension specialists, and others who represent a cross section of their rural community. After obtaining the lists, a random sample was drawn and a letter was sent to invite individuals to join us at a local restaurant or hotel conference room for a free breakfast and discussion on the groundwater quality in their area. In the letter the participants were asked to phone the office and RSVP Three to four days before the focus group, the assistant moderator called the participants that had not responded. The main reason for the RSVP was to confirm a count with the restaurant or the hotel conference room for breakfast. The focus groups ranged from six to ten people, a moderator and an assistant moderator.

The objective of the breakfast was to reward individuals for participating in the focus groups and make them feel more conformable with the moderators and other participants. The moderators first introduced themselves, then each participant had an opportunity to introduce themselves while waiting for the breakfast to be served After breakfast was completed, the focus groups interviews began.

The focus group questionnaire consisted of eleven questions which took about two hours to complete. The moderator asked questions to the group making sure each participant had an opportunity to express their opinions and kept the focus group moving. The assistant moderator taped the interviews and also took extensive notes. The moderators did not bias the questions with their own opinion. A brief summary was written on the major findings. After the completion of all the focus groups an executive report was developed to summarize all of the sessions.

Findings

While the respondents were asked about the groundwater quality in their community, most felt their water was quite good. However, many felt the type of soil and geological soil structure may be a factor for possible problems. Some also commented that the depth of the well or water table played a factor on the quality of the water. Some felt

shallow wells have better tasting water than deeper wells. It was thought that the deeper wells had more iron and sulfur problems. Several respondents stated they did not have their water tested, but plan to now. Also many felt that there are a concern with pesticide contamination and nitrate problems, but not in the agricultural community.

When respondents were asked if there were any threats to the groundwater in their area the biggest concern expressed was the fear and lack of understanding about potential hazards to groundwater to urban, suburban, as well as rural areas. Others felt that development, commercial lawn care providers, urban waste disposal, and attitudes of those outside the agriculture industry were the greatest concerns. Another concern was how the public perceives farmers and how nonagricultural people felt farmers were to blame for groundwater problems.

Next participants were asked if they knew about the Farm*A*Syst (F*A*S) program. Many respondents had heard the name of the program, but were not sure what it was all about. The individuals that heard about the program felt it was a proactive program. They found it was easy to use and liked the voluntary aspect. Some also like the fact it was an awareness program that was very inexpensive.

Unfortunately, some respondents has concerns about Farm*A*Syst. Many were concerned with the individuals performing the evaluation and the confidentiality they were suppose to have. Many did not trust the people conducting the evaluations and did not trust the confidentiality policy. Respondents were nervous that their results may be leaked to the wrong people and could cause problems on the farm. Thus, many indicated a desire to conduct the F*A*S themselves without someone coming on their farm.

The Research Committee of the
American Association for Agricultural Education
issues this

Call for Papers

to be considered for presentation at the

Twenty-Fourth Annual
National Agricultural Education Research Meeting

December 10, 1997
Las Vegas, Nevada

Proposed Specifications

Four copies of the ***complete research paper*** should be submitted for blind review. The paper should not exceed 12 pages (single-spaced, 12 point font). The left margin should be 1½ inches, with the remaining margins one inch. All tables, figures, etc. should be incorporated into the paper (do not append tables or figures to the paper). A computer disk containing the paper as a Microsoft Word for Windows (Version 7.0 or earlier), or Word Perfect for Windows (Version 6.1 or earlier) file should be submitted along with the paper copies.

On matters of style, authors should consult the APA *Publication Manual* (4th Edition). Components to be included in the proposal are as follows:

- Name, mailing address, phone number, FAX number, and e-mail addresses of author(s) on a **separate title page.** The title page will not be considered as part of the 12 page limit. However, a title page must be attached to each of the four copies of the proposal.
- Paper Title (centered, all caps) on first page of paper.
- Introduction/Theoretical Framework.
- Purpose(s)/Objective(s).
- Methods/Procedures
- Results/Findings
- Conclusions/Recommendations/Implications
- References

DEADLINE

Proposals **must** be postmarked by June 2, 1997, and sent by first class mail or overnight delivery (FAX not accepted) to:

Dr. James J. Connors or Dr. Tim H. Murphy
1997 NAERM Co-Chairs
AEEB 2040, 1134 W. 6th Str.
University of Idaho
Moscow, Idaho 83844-2040